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New looks at and for *Onespa*, *Buzyges*, and *Librita* (Lepidoptera: Hesperiidae: Hesperinae), with new combinations and descriptions of a new genus and six new species

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New looks at and for *Onespa*, *Buzyges*, and *Librita* (Lepidoptera: HesperIIDae: HesperIIDinae), with new combinations and descriptions of a new genus and six new species

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**Abstract.** Thirteen species of skippers (six newly described; Lepidoptera: HesperIIDae: HesperIIDinae: HesperIIDini) from higher elevations of Mexico and Central America are reviewed. These are included in four genera (one newly described), some with proposed new combinations. *Onespa* Steinhauser, 1974, originally described as monotypic, is shown to include three species in addition to its type species, *Onespa nubis* Steinhauser, 1974. One of these, *Atrytone gala* Godman, 1900, that has been misplaced in several genera since its description, represents a new combination. The other two species, distributed in montane habitats in northwestern Mexico and in Costa Rica, are described as new. *Buzyges* Godman, 1900, distributed in Mexico and Central America and also formerly considered monotypic, is shown to embrace four species. Besides the type species, *Buzyges idothea* Godman, 1900, two species long placed in *Poanes* Scudder, 1872, *Pamphila rolla* Mabille, 1883, and *Poanes benito* Freeman, 1979, are included as new combinations. Another species, known only from Costa Rica, is described as new. These are united by several superficial characters, but especially by genital morphology of both sexes. *Librita* Evans, 1955, was described to include three species of which one, *Librita raspa* Evans, 1955, was subsequently removed. *Augiades heras* Godman, 1900 is here also removed from *Librita* and placed in a new genus with three previously undescribed species. This completes the disintegration of *Librita*, which is now monotypic. The four genera, although exhibiting similarities suggesting potential alliance, differ in their unique combinations of several superficial and genital traits from each other and other hesperiine skippers.

**Key words.** Central America, genitalia, Mexico, skipper, taxonomy.

## Introduction

Evans (1955) organized hesperiine skippers (Lepidoptera: HesperIIDae: HesperIIDinae) of the New World into numerous groups and subgroups. Although many of his allotments have not withstood closer scrutiny (e.g., Burns 1990, 1992a; Warren et al. 2008a, 2009), Evans' (1955) studies provide a useful framework upon which subsequent taxonomies may be constructed. More recent investigations resulted in taxonomic refinement and rearrangements of hesperiid taxonomy (e.g., Warren et al. 2008a, 2009). Studies have led to detection of misplaced species (Burns 1987, 1989, 1992a, 1994b, 1996, 1998; Burns and Janzen 2005a), enhancement of richness of already speciose genera (Austin and Mielke 1997, 2008; MacNeill 1993; Hebert et al. 2004; Burns et al. 2007; Warren et al. 2008b; Warren 2009), identification of species-level synonymies (Burns 1994b, Mielke and Casagrande 2002), and reduction in the number of genera formerly considered monotypic (Burns 1974, Burns 1996; Austin and Mielke 2000; Burns and Janzen 2005b; Warren et al. 2008a; Warren and Austin, in press). In addition, there has been a realization that species-level taxa were often subsumed by Evans (1951, 1952, 1953, 1955) as subspecies or synonyms of others (Austin and Mielke 2000, 2008; Burns and Janzen 2001; Austin and Warren 2002; Austin 2008). Many of the currently recognized combinations within several genera of hesperiines are evinced by genital morphology of both sexes (e.g., Burns 1987, 1989, 1992a, 1994a, 1994b). In numerous instances, these combinations are at odds with long-standing synonymies classically based on external traits. These redistributions have not only arisen from more detailed investigations, but also from discoveries of undescribed phenotypes providing a yet broader foundation upon which to evaluate interspecific variation and formulate taxonomic decisions.

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Among those genera yet remaining with but a single species are two, *Onespa* Steinhauser, 1974, and *Buzyges* Godman, 1900 (Hesperiini), that have stood as monotypic since their descriptions. Their uniqueness has not been supported by traits that have been closely scrutinized, nor have they been compared in detail with other potentially allied taxa. Here, those genera are examined in more detail, resulting not only in the proposal of new combinations, but also in the description of three new species. Both genera are recharacterized to encompass their type species and the newly associated taxa.

Among genera of hesperiines comparatively examined during this study another little studied genus, *Librita* Evans, 1955, proved similar in several genital respects to both *Onespa* and *Buzyges*. The prevailing concept of *Librita* (e.g., Mielke 2005a) did not appear monophyletic. Consequently, *Librita* is re-described in more detail than originally and a new genus is proposed to embrace one species long included in *Librita* and three previously undescribed species of this new genus.

## Materials and Methods

Length of the forewing is from the base to its greatest length at the apex. Genital terminology is after Burns (1992a) and MacNeill and Herrera (1998). Full synonymies were given by Mielke (2005a, 2005b). Specimens examined are deposited in the collections of the the American Museum of Natural History, New York (AMNH); The Natural History Museum, London, England (BMNH); the Denver Museum of Nature and Science, Denver, Colorado (DMNH); the Instituto de Biología, Universidad Nacional Autónoma de México, Mexico City, Mexico (UNAM); McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, Gainesville, Florida (MGCL); the Museo de Historia Natural y Cultura Ambiental de la Ciudad de México, Mexico City, Mexico (MHNM); the Museo de Zoología, Facultad de Ciencias, Universidad Nacional Autónoma de México, Mexico City, Mexico (MZFC); the National Museum of Natural History, Washington, D.C. (USNM), and the private collections of Andrew D. Warren, Castle Rock, Colorado (ADWC); Jim Brock, Tucson, Arizona (JPBC); Ichiro Nakamura, Williamsville, New York (INIC); the de la Maza Family, Mexico City, Mexico (MAZA); and William Haber, Monteverde, Costa Rica (WAHC). Dissection numbers are given on labels for 'GTA' (George T. Austin), 'LDM' (Lee D. Miller), 'SRS' (Stephen R. Steinhauser), 'ADW' (Andrew D. Warren) and 'X' (John M. Burns).

## *Onespa* Steinhauser, 1974

Type species: *Onespa nubis* Steinhauser, 1974, by original designation.

*Onespa* has remained an apparent outlier among hesperiines since its description (along with its sole included species, *Onespa nubis* Steinhasuser, 1974). Steinhauser (1974) offered little on its potential relationships except that it "belongs in the *Hesperia* sub-group of the *Hesperia* group (Group M of Evans [1955]) of the sub-family Hesperinae." He compared *Onespa* with several genera having little resemblance in several superficial and genital traits. Steinhauser (1974) correctly noted an overall absence of knowledge of female genitalia among hesperiids in general with the implication that these may be of particular import in resolving relationships among species. As such, *Onespa* is herein reevaluated indicating it as a polytypic genus with the proposal of a new combination and descriptions of two new species. This first requires a refinement and elaboration of its original description. For this, Steinhauser's (1974) description of *Onespa* is reproduced verbatim below with our additions in bold font to augment that description and to encompass the species included within the genus herein.

**Description.** Palpi quadrate **to subquadrate**, shaggy, third segment slender, slightly porrect (**about mid-way between porrect and erect**), hidden in hairs of second segment. Antennae about 1/2 costa (**49-53%**); club stout, about 1/3 shaft, bent to constricted apiculus beyond thickest part; nudum 5/7 (**varies from 11 to 15 segments**), subequally divided between club and apiculus (**about 4-6 segments on club, 6-9 segments on apiculus**) which is about 1.0 to 1.5 times club width; shaft black above, **usually not** checkered yellow and black above, **black and checked with yellow, yellow-orange, or white** below; nudum **red-brown**.

Wings somewhat produced; forewing apex 1.3 - 1.4 times length along vein 2A; hindwing longest at veins 2A and Cu<sub>1</sub>; 3A=Sc+R<sub>1</sub>. No secondary sex characters in male. Hindwing origin Rs nearer to cell end

than base. Forewing origin  $Cu_2$  mid base and origin  $Cu_1$ . **Sexual dimorphism prominent or minor.** Wings brown with **yellow-orange or** ochreous (male), **yellow-orange or** ochreous and white (female) maculation.

Mid and hindtibiae smooth (**spined on one new species**) with long, dense fringes on both tibia and femur; midtibiae with one pair spurs, hindtibiae two pairs; outer spur in each pair 1/2 or less (**to about 3/4**) length of inner spur.

Male genitalia with gnathos bifid, arms slender and connivent, uncus narrow, slightly bilobed at end, same width as **or somewhat narrower than** gnathos in dorsal view, **slightly longer than gnathos**; separation of gnathos and uncus in lateral view **shallowly to** moderately deep. **Tegumen flaring cephalad, ventral arm with dorsal arm of saccus combining into a curved structure, anterior arm of saccus long to very long, narrowing to a pointed cephalic end in ventral view.** Valvae remarkably simple and unarticulated, **with costa/ampulla relatively straight and undifferentiated between themselves and harpe, ampulla with small dorsal triangular process caudad, harpe with caudal end produced.** Aedeagus broad and elongate (1.1-1.7 times length of valva), with complex cornuti **consisting of at least one often large pointed spike and a spinulose pad (scouring pad of Burns 1994b),** but lacking terminal **caudally directed processes (titillators of Burns 1987)** common in *Poanes* and *Paratrytone*, **although lateral triangular keel-like titillators may be present on the right side caudad.**

Female genitalia characterized by long (2.5 [2.7-3.6] mm), straight, **complexly and** heavily striated (=wrinkled) ductus bursae, **as long as or** longer than corpus bursae. Lamella antevaginalis broad **and moderately to** deeply indented **U-shaped or** V-wise; lamella postvaginalis with smooth U-shaped indentation; ostium bursae broad and shallow, twice as broad as deep; **cephalic end of ductus bursae wrinkled and expanded with heavily sclerotized nodular pouch-like structure on its left side.** Corpus bursae lightly **or more prominently** striated (=wrinkled) longitudinally **cephalad, no signa.**

**Distribution and richness.** As delineated below, the four species included in *Onespa* are known to occur in northwestern Mexico (Sonora-Sinaloa), the Eje Neovolcanico of south-central Mexico, in cloud forests from the Sierra de Juarez, Oaxaca (southern Mexico) through Chiapas and Guatemala, and in El Salvador and Costa Rica. *Onespa* occur in montane habitats, from about 1600 m in northwestern Mexico, to about 2400 m in Central America.

Further discussion and diagnosis of the genus is deferred until after the included species are described.

#### ***Onespa nubis* Steinhauser, 1974**

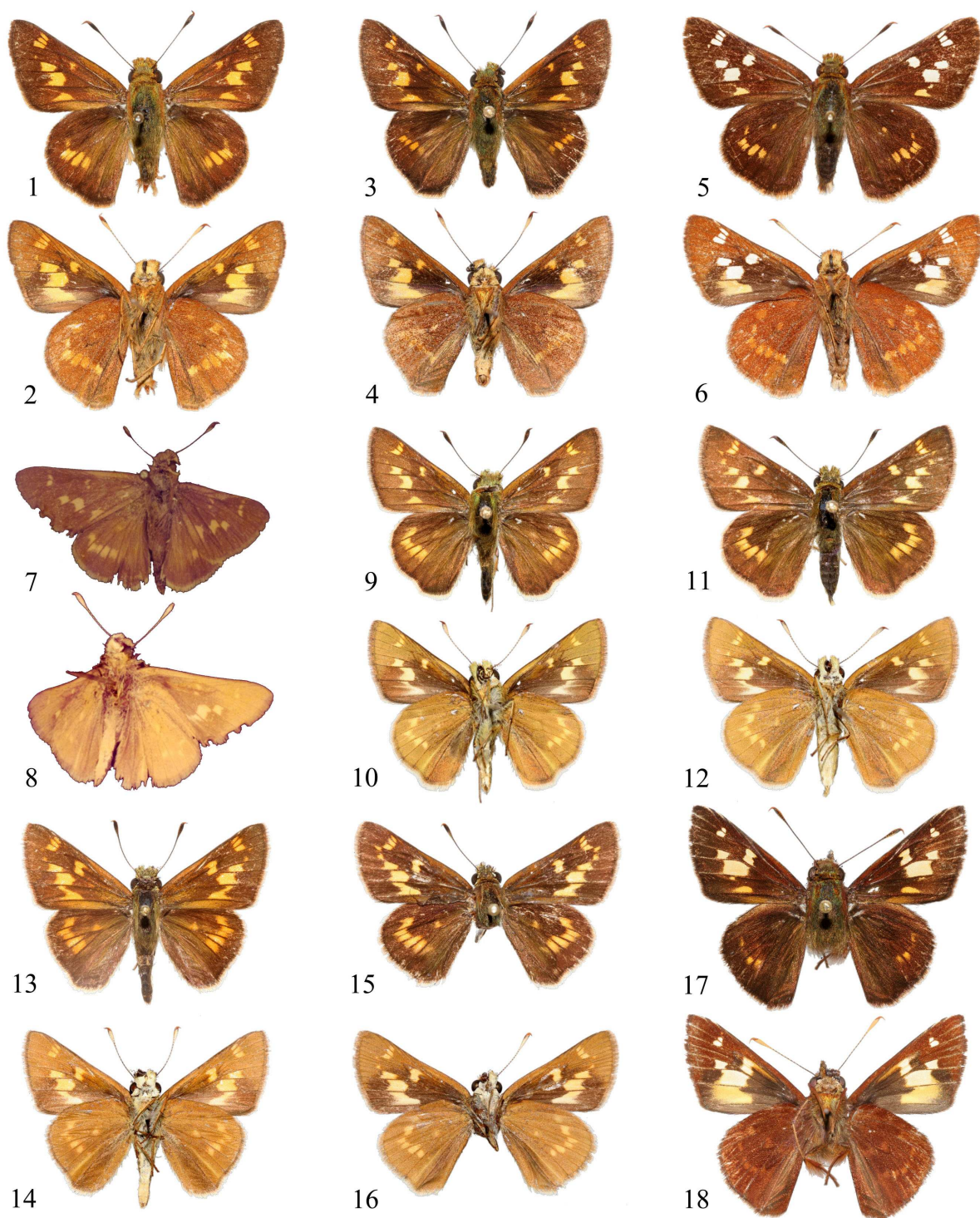
(Fig. 1-6, 63, 75, 87)

*Onespa nubis* Steinhauser, 1974. Type locality: EL SALVADOR: Hacienda Montecristo, Cerro Miramundo cloud forest, 2300 m (based upon holotype); holotype male (Fig. 1-2) in collection of Allyn Museum of Entomology, now housed at MGCL.

**Description. Male** (Fig. 1-4) - mean forewing length = 16.8 mm (15.4-17.7 mm, n=5; from El Salvador, Guatemala, Mexico); forewing with pointed apex, termen convex, no stigma or brand; hindwing convex, lobate at tornus; dorsal forewing dark brown; proximal 1/2 costa orange; sparse orange overscaling in base of discal cell and  $CuA_2-2A$ ; orange overscaling of flat and setiform scales in proximal 1/2 or more of anal cell; opaque yellow-orange macules as follows: subapical in mid- $R_3-R_4$  (may be indistinct and reduced to a few orange scales) and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, increasing in size caudad, all more or less aligned and perpendicular to costa; postmedial in  $M_3-CuA_1$ , 1/4 distance from base, more or less quadrate; in  $CuA_1-CuA_2$ , largest, also more or less quadrate, distad of origin of  $CuA_1$ , distal edge roughly aligned with proximal edge of macule in  $M_3-CuA_1$ ; in posterior  $CuA_2-2A$ , more or less triangular; anterior part of  $CuA_2-2A$  may have minute orange macule; macule in discal cell somewhat hourglass-shaped, about 1/4 distance from distal end; fringe brown proximad, narrowly gray distad.

Dorsal hindwing dark brown; proximal 2/3 overscaled with long ochreous and brown setiform scales caudad of vein  $Sc+R_1$ , extending nearly to termen along vein 2A; prominent opaque yellow-orange postme-





**Figure 1-18.** *Onespa* (full data in text; ds = dorsal surface, vs = ventral surface; scale bar = 10 mm). **1)** *O. nubis*, holotype male, El Salvador, 25 March 1972, ds; **2)** same, vs; **3)** *O. nubis*, male, El Triunfo, Chiapas, Mexico, 22 March 2007, ds; **4)** same, vs; **5)** *O. nubis*, paratype female, El Salvador, 28 December 1971, ds; **6)** same, vs; **7)** *O. gala*, holotype male, Veracruz, Mexico, ds, reproduced from photograph at MGCL; **8)** same, vs; **9)** *O. gala*, male, Michoacán, Mexico, 22 July 1996, ds; **10)** same, vs; **11)** *O. gala*, female, Michoacán, Mexico, 27 July 1996, ds; **12)** same, vs; **13)** *O. brockorum*, holotype male, Sonora, Mexico, 24 July 1997, ds; **14)** same, vs; **15)** *O. brockorum*, paratype female, Sonora, Mexico, 22 July 1985, ds; **16)** same, vs; **17)** *O. nakamura*, holotype male, Costa Rica, 13 June 2005, ds; **18)** same, vs.

dial macules in  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ , and  $CuA_1$ - $CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1$ - $M_3$  divided by thin line of brown, minute orange macule (may be only a few orange scales) in  $Rs$ - $M_1$ , offset proximad from macule in  $M_1$ - $M_3$ ; fringe brown proximad, gray distad.

Ventral forewing dark brown (nearly black), gray-brown in anal cell; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with bright red-brown, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3$ - $CuA_1$ , extending narrowly in marginal area to vein  $CuA_2$ ; discal cell overscaled with bright red-brown distad; macules as on dorsum except macule in  $CuA_2$ -2A well-developed, yellow, extending broadly across entire cell.

Ventral hindwing entirely overscaled with bright red-brown except sparser on both sides of vein 2A, and as vaguely paler postmedial macules and a small macule at distal end of discal cell.

Dorsal head black with red-brown setiform scales, ochreous behind and beneath eye; dorsal and lateral palpi quadrate, mixture of black and ochreous-orange setiform scales, pale ochreous on venter, black on inner surface, 3rd segment black with a few ochreous scales, barely extending beyond scales of 2nd segment; antennae 53% of costal length, shaft black on dorsum, checkered with ochreous on venter, this becoming broader distad, club 32% of length of shaft, dorsal club black, ventral club ochreous proximad, black distad, nudum red-brown becoming darker at tip, 11 (n=1), 12 (n=1), or 13 (n=2) segments; dorsal thorax ochreous with green iridescence caudad; ventral thorax red-brown with green iridescence, pectus ochreous; legs brown proximad, red-brown distad with long red-brown setiform scales especially proximad, protibia not spined, red-brown epiphysis extending distad to slightly overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black, long olive setiform scales cephalad, scattered ochreous scales caudad; ventral abdomen ochreous.

Genitalia (Fig. 63, 75) - uncus short, hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, well-separated from and slightly shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, broader than uncus; tegumen thin in lateral view, moderately broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure broadest and bent ventrad of its middle; anterior arm of saccus long and thin, straight, nearly 1.5 times length of uncus and dorsal portion of tegumen, narrow in ventral view and tapering gradually to blunt cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe tapering to bluntly pointed caudal end, sacculus narrow, ventral edge of valva prominently concave in middle; aedeagus straight, tubular, long, about 1.5 times length of valva, caudal end slightly expanded, blunt, no titillator; vesica with cornuti including an elongate flexible spinulose pad and two, large, heavily sclerotized, and sharply pointed spikes.

**Female** (Fig. 5-6) - mean forewing length = 17.2 mm (16.2-18.6 mm, n=4, from Mexico and El Salvador); forewing with pointed apex, termen convex (more so than on male); hindwing convex (more so than on male), lobate at tornus; dorsal forewing dark brown; proximal 1/2 costa red-brown; sparse red-brown overscaling in base of discal cell and  $CuA_2$ -2A; red-brown overscaling of flat and setiform scales in proximal 2/3 of anal cell; translucent white macules as follows: subapical in mid- $R_3$ - $R_4$  and near bases of  $R_4$ - $R_5$  and  $R_5$ - $M_1$ , more or less quadrate, that in  $R_5$ - $M_1$  largest, more or less aligned and perpendicular to costa; postmedial in  $M_3$ - $CuA$ , 1/3 distance from base, subquadrate; in  $CuA_1$ - $CuA_2$ , variable, more or less quadrate, largest, distad of origin of  $CuA_1$ , distal edge approximately aligned with center of macule in  $M_3$ - $CuA_1$ ; macule in discal cell irregular in shape, about 1/4 distance from distal end; may be white submarginal dots in  $M_1$ - $M_2$  and  $M_2$ - $M_3$ ; opaque yellow postmedial macule in  $CuA_2$ -2A, more or less overlapped by macule in  $CuA_1$ - $CuA_2$ , poorly developed cephalad (usually a dot), more or less triangular caudad; fringe brown proximad, narrowly gray distad.

Dorsal hindwing dark brown; proximal 2/3 overscaled with long ochreous and brown setiform scales caudad of vein  $Sc+R_1$ , extending nearly to termen along vein 2A, prominent opaque yellow-orange postmedial macules in  $Rs$ - $M_1$ ,  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ , and  $CuA_1$ - $CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1$ - $M_3$  divided by thin line of brown, that in  $Rs$ - $M_1$  offset proximad and variably developed; yellow-orange macule may be at end of discal cell; fringe brown.

Ventral forewing dull dark brown, paler gray-brown in anal cell; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with bright red-brown, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3$ - $CuA_1$  and extending narrowly in marginal area to vein  $CuA_2$ ; discal

cell overscaled with bright red-brown distad; macules as on dorsum except macule in  $CuA_2$ -2A broad, completely across cell, yellow.

Ventral hindwing entirely overscaled with bright red-brown except sparser on both sides of vein 2A, and as pale yellow-orange postmedial macules extending cephalad to  $Sc+R_1$ -Rs and a small, vague macule at distal end of discal cell.

Dorsal head black with mixture of black, white, and ochreous setiform scales, some with greenish iridescence, white spots just behind antennae, white behind eye becoming ochreous ventrad; palpi quadrate, dorsum with mixture of black and ochreous setiform scales, pale ochreous on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae 51% of costal length, shaft black on dorsum, checkered broadly with whitish on venter, club 32% of length of shaft, dorsal club black, ventral club white and pale ochreous, nudum red-brown becoming darker at tip, 12 (n=2) or 13 (n=1) segments; dorsal thorax ochreous with green iridescence especially centrally; ventral thorax ochreous and pale blue; legs brown proximad, ochreous-brown distad with long ochreous and pale blue setiform scales especially proximad, protibia not spined, red-brown epiphysis, extending distad to overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black, gray at segments, long olive setiform scales cephalad; ventral abdomen pale blue centrally becoming pale yellow caudad, whitish laterally.

Genitalia (Fig. 87) - lamellae broad, caudal edge of lamella postvaginalis excavate centrally into relatively broad and shallow V-shape, lamella antevaginalis narrower than lamella postvaginalis, deeply excavate in V-shape centrally, ostium bursae about twice as broad as deep; ductus bursae long (2.7 mm including antrum), relatively straight (ventral and lateral views) antrum that is complexly sclerotized as a number of apparent longitudinal plates, ductus bursae cephalad expanded asymmetrically to the left, transversely wrinkled, largely membranous, but with some sclerotization especially as conspicuous left lateral pouch-like structure; corpus bursae elongate, nearly 2 times as long as broad, indistinctly wrinkled longitudinally.

**Specimens examined.** **EL SALVADOR:** Hda. Montecristo, Cerro Miramundo Cloud Forest, 2300m, 25 March 1972, *leg.* S. & L. Steinhauser (holotype male; MGCL); Hda. Montecristo, Co. Miramundo, Metapán, 2300m, cloud forest, 26 March 1972, *leg.* S. & L. Steinhauser (1 paratype male, X #3087; MGCL); same locality and collector, 13 March 1971 (1 paratype female, M #2375; MGCL); Hda. Montecristo, Co. Miramundo, Metapán, 2400m, Trifino, cloud forest, oviposit on bamboo, 28 December 1971, *leg.* S. & L. Steinhauser (1 paratype female; MGCL); **GUATEMALA:** Purulha, July, Schaus and Barnes coll. (1 male, SRS #4803; MGCL); **MEXICO:** Chiapas; Volcan Huitepec, NE, B. Mesofilo, 2700m, 2 August 1987, *leg.* R. de la Maza E. (1 male; MAZA); Mpio. Angel Albino Corzo, El Triunfo, vic. campamento, 1900m, 22 March 2007, *leg.* A. D. Warren (1 male; ADWC); **MEXICO:** Oaxaca; Mo Coúo (Cerro Pelón), Mpio. Yolox, 2150m, 12 September 1961, *leg.* E. C. Welling (1 male, LDM #3650; MGCL), same locality and collector, 13 September 1961, (1 female, GTA #14056; MGCL); Mpio. Santiago Comaltepec, La Esperanza, 1750m, 17 September 1987, *leg.* ? (1 female, ADW #97-115; ADWC); Sierra Juarez, 28 February 1992, *leg.* ? (1 male; ADWC).

**Distribution and phenology.** *Onespa nubis* is known from El Salvador and Guatemala to Oaxaca and Chiapas in southern Mexico (Steinhauser 1974, this study) in montane cloud forest, at least from 1750 to 2700 m in elevation. Available records for February, March, July-September, and December suggest a flight period during the local dry season (roughly December through April), with a second flight during the humid months of August and September.

**Biological notes.** Steinhauser (1974) reported a species of *Chusquea* (Poaceae) as the larval foodplant for *O. nubis* in El Salvador. The species flies in association with that same genus in Chiapas, Mexico (ADW, pers. obs.). Males guard perches between one and three meters above the ground in small sunny clearings within otherwise dense forest, at least during midday.

**Discussion.** The foregoing description elaborates on that given in the original description (Steinhauser 1974), where it was indicated that males of *O. nubis*, in dorsal view, initially resemble a large *Paratrytone*



(now *Poanes*) *melane poa* Evans, 1955. As was noted, however, genital (illustrated by Godman and Salvin 1879-1901, Lindsey et al. 1931; reproduced by Burns 1992a) and other characters of that species are very different. Further consideration of *O. nubis* will be included in the discussion of the genus below.

***Onespa gala* (Godman, 1900), new combination**

(Fig. 7-12, 65, 76, 88)

*Atrytone gala* Godman, 1900 (in Godman and Salvin 1879-1901, 2:495). Type locality: MEXICO: [Veracruz]; Las Vigas; holotype male (Fig. 7-8) in Schaus' collection at USNM.

**Description. Male** (Fig. 7-10) - mean forewing length = 14.7 mm (14.0-15.2 mm, n=10; from Michoacán, Mexico); forewing with pointed apex, termen slightly convex, no stigma or brand; hindwing convex, weakly lobate at tornus; dorsal forewing brown with golden iridescence; proximal 1/2 costa yellow-orange; sparse paler yellow-orange overscaling in base of discal cell and  $CuA_2-2A$ ; yellow-orange overscaling of flat and setiform scales in middle 1/2 of anal cell; opaque pale yellow-orange macules as follows: subapical in mid- $R_3-R_4$  and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, all of about equal size, macule in  $R_4-R_5$  slightly offset proximad from other two, series more or less perpendicular to costa, an additional smaller macule in  $R_2-R_3$  on one specimen offset proximad from remainder of series; postmedial,  $M_3-CuA_1$ , 1/3 distance from base, quadrate (but with concave distal edge);  $CuA_1-CuA_2$ , curved (distal edge concave, proximal edge convex), largest, centered in mid-cell distad of origin of  $CuA_1$ , overlapping proximal 1/4 to 1/2 of macule in  $M_3-CuA_1$  and macule in  $CuA_2-2A$  that is poorly developed as a dot (or absent) cephalad, more or less triangular caudad; macule in discal cell hourglass-shaped, about 1/4 distance from distal end (just proximad of origin of vein  $CuA_1$ ); one specimen (of 36 examined) with small pale yellow-orange submarginal dot in each  $M_1-M_2$  and  $M_2-M_3$ ; fringe brown proximad, gray distad.

Dorsal hindwing brown with golden iridescence; proximal 2/3 overscaled with long brown and ochreous setiform scales caudad of vein  $Sc+R_1$ , extending nearly to termen along vein 2A; prominent opaque pale yellow-orange postmedial macules in  $Rs-M_1$ ,  $M_1-M_3$ ,  $M_3-CuA_1$ , and  $CuA_1-CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1-M_3$  divided by thin line of brown, that in  $Rs-M_1$  variably offset proximad; vaguely defined pale yellow-orange macule at distal end of discal cell; fringe brown proximad, gray distad, becoming entirely white caudad of mid-cell  $CuA_2-2A$ .

Ventral forewing dull brown; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with yellow-orange giving olive-brown aspect, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3-CuA_1$ , narrowing to vein 2A; anterior discal cell sparsely overscaled with orange, flat and setiform scales; posterior 1/2 of  $CuA_2-2A$  (proximad of pale macule) and all of anal cell gray-brown; macules as on dorsum except macule in  $CuA_2-2A$  often better developed than on dorsum cephalad and cream colored.

Ventral hindwing entirely overscaled with yellow-orange giving olive-brown aspect except sparser on both sides of vein 2A, and as paler postmedial macules and a small macule at distal end of discal cell.

Dorsal head black with mixture of black, white, ochreous, and red-brown setiform scales, small white spots just behind antennae, white behind eye becoming ochreous ventrad; dorsal palpi mixture of black and ochreous setiform scales, pale ochreous on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae 51% of costal length, shaft black on dorsum, checkered narrowly with whitish on venter, club 33% of length of shaft, dorsal club black, ventral club ochreous and yellow-orange, nudum red-brown becoming darker at tip, 12 (n=6), 13 (n=8), or 14 (n=3) segments; dorsal thorax ochreous with green iridescence especially centrally; ventral thorax ochreous; legs brown proximad, ochreous-brown distad with long ochreous setiform scales especially proximad, protibia not spined, red-brown epiphysis long, extending distad to overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 3/4 length of inner, metatibia not spined, two pairs of spurs, outer about 3/4 length of inner; dorsal abdomen black, gray at segments, long olive setiform scales cephalad; ventral abdomen pale blue centrally, whitish laterally.

Genitalia (Fig. 65, 76) - uncus short, hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, slightly broader than uncus in middle; tegumen thin in lateral view, broad in dorsal view and flaring cephalad,

ventral arm combining with dorsal arm of saccus, this combined structure broadest and bent ventrad of its middle; anterior arm of saccus long and thin, mostly straight but slightly upcurved cephalad, nearly 2 times length of uncus and dorsal portion of tegumen, narrow in ventral view and tapering gradually to pointed cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe curved and produced caudad, interior surface with curved row of small and sharply pointed teeth, sacculus narrow, ventral edge of valva prominently concave in middle; aedeagus slightly curved caudad, tubular, long, about 1.7 times length of valva, caudal end slightly expanded, blunt, small triangular titillator on right side just cephalad of caudal end; vesica with cornuti including a flexible spinulose pad and a large heavily sclerotized and sharply pointed spike.

**Female** (Fig. 11-12) - mean forewing length = 16.0 mm (15.1-16.8 mm, n=10; from Michoacán, Mexico); forewing with pointed apex, termen convex (more so than on male); hindwing convex (more so than on male), weakly lobate at tornus; dorsal forewing brown, duller than on male with faint iridescence; proximal 1/2 costa yellow-orange (deeper colored than on male); sparse yellow-orange (deeper colored than on male) overscaling in bases of discal cell and  $CuA_2-2A$ ; yellow-orange overscaling of flat and setiform scales in middle 1/2 of anal cell; opaque pale yellow-orange macules as follows: subapical in mid- $R_3-R_4$  and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, increasing in size caudad, more or less aligned, series more or less perpendicular to costa; postmedial,  $M_3-CuA_1$ , 1/3 distance from base, quadrate, distal caudal edge slightly extended distad cephalad of vein  $CuA_1$ ;  $CuA_1-CuA_2$ , quadrate or curved (distal edge concave, proximal edge convex), largest, distad of origin of  $CuA_1$ , not or barely overlapping proximal edge of macule in  $M_3-CuA_1$ , overlapping macule in  $CuA_2-2A$  that is poorly developed cephalad (usually an oblique streak), more or less triangular caudad; macule in discal cell hourglass-shaped, about 1/4 distance from distal end (proximal of origin of vein  $CuA_1$ ); five specimens (of 27 examined) with small pale yellow-orange submarginal dot in each  $M_1-M_2$  and  $M_2-M_3$ ; fringe brown proximad, gray distad.

Dorsal hindwing brown without iridescence seen on male; proximal 2/3 overscaled with long ochreous and brown setiform scales caudad of vein  $Sc+R_1$  nearly extending to termen along vein 2A; prominent opaque pale yellow-orange postmedial macules in  $Rs-M_1$ ,  $M_1-M_3$ ,  $M_3-CuA_1$ , and  $CuA_1-CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1-M_3$  divided by thin line of brown, that in  $Rs-M_1$  offset proximad with distal edge at about center of macule in  $M_1-M_3$ ; vaguely defined pale yellow-orange macule occasionally at distal end of discal cell; fringe brown proximad, gray distad becoming entirely white distad caudad of mid-cell  $CuA_2-2A$ .

Ventral forewing dull very dark brown, paler brown distad of postmedial macules and in anal cell; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with yellow-orange giving olive-brown aspect, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3-CuA_1$ , narrowing to vein  $CuA_2$ ; anterior discal cell sparsely overscaled with orange setiform scales; macules as on dorsum except macule in  $CuA_2-2A$  better developed cephalad and cream color, faint additional subapical macule in  $R_2-R_3$  on one specimen (of 27), offset proximad so that distal edge aligned with proximal edge of macule in  $R_3-R_4$ .

Ventral hindwing entirely overscaled with yellow-orange giving olive-brown aspect except sparser on both sides of vein 2A, and as pale yellow-orange postmedial macules and a small vague macule at distal end of discal cell.

Dorsal head black with mixture of black, white, and ochreous setiform scales, some with greenish iridescence, white spots just behind antennae, white behind eye becoming ochreous ventrad; dorsal palpi mixture of black and ochreous setiform scales, pale ochreous on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae 50% of costal length, shaft black on dorsum, checkered broadly with whitish on venter, club 34% of length of shaft, dorsal club black, ventral club white and pale ochreous, nudum red-brown becoming darker at tip, 12 (n=3) or 13 (n=3) segments; dorsal thorax ochreous with green iridescence especially centrally; ventral thorax ochreous and pale blue; legs brown proximad, ochreous-brown distad with long ochreous and pale blue setiform scales especially proximad, protibia not spined, red-brown epiphysis long, extending distad to overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black, gray at segments, long olive setiform scales cephalad; ventral abdomen pale blue centrally becoming pale yellow caudad, whitish laterally.

Genitalia (Fig. 88) - lamellae subquadrate, caudal edge of lamella postvaginalis excavate centrally into relatively broad and shallow V-shape, lamella antevaginalis narrower than lamella postvaginalis, excavate centrally, ostium bursae about twice as broad as deep; ductus bursae long (3.2 mm including antrum), relatively straight (ventral and lateral views) antrum that is complexly sclerotized as a number of apparent longitudinal plates, ductus bursae cephalad expanded asymmetrically, horizontally wrinkled, largely membranous, but with some sclerotization especially as conspicuous left lateral pouch-like structure; corpus bursae elongate, about 2 times as long as broad, indistinctly wrinkled longitudinally.

**Specimens examined.** **MEXICO:** Distrito Federal; Delegación Magdalena Contreras, Cañada de la Magdalena Contreras, Dinamo 1, 2670m, 1 June 1983, *leg.* A. Luis-Martínez (1 male; MZFC), same locality and collector, 28 June 1983 (1 male; MZFC), 29 June 1983 (1 male; MZFC); Delegación Miguel Hidalgo, 3ra. Secc. del Bosque de Chapultepec, 24 June 1993, *leg.* N. Figueroa (3 males; MHNM), same locality and collector, 9 July 1992 (1 male; MHNM); **MEXICO:** Guerrero; Mpio. Chilpancingo, Omiltemi, Hortiguillas, 3 July 1985, *leg.* I. Vargas (1 female; MZFC); Omiltemi, Cueva del Borrego, 5 August 1985, *leg.* I. Vargas (1 male; MZFC); **MEXICO:** Michoacán; Mpio. Uruapan, Cerro de la Cruz, 2200m, 22 July 1996, *leg.* A. D. Warren (10 males, 8 females, GTA #14067; ADWC); same locality and collector, 23 July 1996, *leg.* A. D. Warren (5 males, GTA #14066, 3 females; ADWC), 27 July 1996, (11 males, GTA #14065, 9 females, GTA #14068; ADWC), 24 August 1991, *leg.* L. González-Cota (2 males, ADW #95-77; ADWC), 29 August 1997, *leg.* A. D. Warren (1 male; ADWC); **MEXICO:** Veracruz; Las Vigas (holotype male; USNM).

**Distribution and phenology.** *Onespa gala* occurs in the Eje Neovolcanico and Sierra Madre del Sur of south-central Mexico, being recorded with certainty only from Veracruz (Las Vigas; holotype male), Distrito Federal, Michoacán, and Guerrero; records span the period from early June to late August. In Michoacán, *O. gala* has been found only on Cerro de la Cruz, Municipio Uruapan, despite intensive searches elsewhere in the northwestern part of the state. The reported occurrence of *O. gala* in El Salvador has yet to be confirmed (*e.g.*, Steinhauser 1975). Stanford and Opler (1993) reported this species (as *Mellana gala*) from Sinaloa and Durango, Mexico. Their record from Sinaloa undoubtedly refers to the following species, and their record from Durango (details not available) most likely does as well.

**Biological notes.** On Cerro de la Cruz, Michoacán (the foot of which is occupied by urban Uruapan), this species is common in late July, from 1900 to 2300 m (most abundant around 2200 m), in steep, grassy areas between pines, and adults visit a number of flowers for nectar, especially an undetermined species of *Salvia* L. (Lamiaceae). One or more of several grass species (Poaceae) on Cerro de la Cruz are suspected to serve as larval foodplants; no *Chusquea* was observed in the habitat (ADW, pers. obs.).

**Discussion.** *Atrytone gala* has long been an unknown species, until recently perhaps known only from its holotype. Although its wings were illustrated by Godman and Salvin (1879-1901), its genitalia have not been portrayed or described and its placement among hesperiines has had no stability, floating from one genus to another without solid justification. Evans (1955) obviously did not examine the species since he questioningly synonymized it with the very different *Mellana monica* (Plötz, 1886); that taxon is now synonymized with *Quasimellana nicomedes* (Mabille, 1883) (Burns 1994b). The error of Evans' (1955) synonymy was noted by Steinhauser (1975) who retained *A. gala* in *Mellana* Hayward, 1948, but at the species-level. Burns (1994b) noted that *A. gala* was not congeneric with the many species included in *Mellana* by Evans (1955), but did not elaborate further. Mielke and Casagrande (2002), upon examination of the type of *A. gala*, placed the taxon in *Paratrytone* Godman, 1900, without further comment. That placement is curious since *A. gala* does not particularly resemble any species of *Paratrytone* and that genus has a well-developed stigma (*e.g.*, Burns 1992a). Males from Michoacán, compared with the holotype and its genitalia by the junior author, were found to be indistinguishable from that specimen as illustrated in Godman and Salvin (1879-1901).

In the absence of a stigma on males, the lack of tibial spines, and other superficial characters, *Atrytone gala* is embraced within the description of *Onespa*. On males, the undivided uncus, divided gnathos, long and thin saccus, simple valvae with a short dorsal projection near the juncture of the ampulla and harpe, and a long aedeagus with spike-like and flexible cornuti are similar to structures seen on *Onespa nubis*.

Female genitalia likewise resemble those of *O. nubis* with relatively broad lamellae, an elongate sclerotized antrum, and an asymmetrical cephalic portion of the ductus bursae with a sclerotized pouch-like structure. This combination of genital characters is not observed in any other genus of Hesperinae (see general discussion below). Genital morphology of both sexes thus strongly supports the inclusion of *A. gala* in *Onespa* and this new combination is here proposed.

***Onespa brockorum* Austin and A. Warren, new species**

(Fig. 13-16, 64, 77, 89)

**Description. Male** (Fig. 13-14) – mean forewing length = 15.7 mm (15.3-16.2 mm, n=10; from Sonora, Mexico); forewing with pointed apex, termen slightly convex, no stigma or brand; hindwing convex, weakly lobate at tornus; dorsal forewing brown with golden-orange iridescence; proximal 1/2 costa orange; sparse orange overscaling in bases of discal cell and  $CuA_2-2A$ ; orange overscaling of flat and setiform scales in middle 1/2 or more of anal cell; opaque yellow-orange macules as follows: subapical in mid  $R_3-R_4$  and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, anterior macule smallest or all of about equal size, more or less aligned and perpendicular to costa, one specimen (of 13 examined) with additional small macule in  $R_2-R_3$  offset proximad from other subapical macules; submarginal in  $M_1-M_2$  and  $M_2-M_3$ , small, nearly 2/3 distance to termen from bases of cells, more or less triangular, that in  $M_1-M_2$  usually smallest with anterioproximad corner at posteriodistad corner of subapical macule in  $R_5-M_1$ ; postmedial in  $M_3-CuA_1$ , 1/3 distance from base of cell, quadrate (but with concave distal edge), overlapping distal edge of macule in  $M_2-M_3$ ;  $CuA_1-CuA_2$ , more or less quadrate but with distal edge concave, largest, distad of origin of  $CuA_1$ , more or less centered under proximal edge of macule in  $M_3-CuA_1$ , completely overlapping macule in  $CuA_2-2A$  that is chevron-shaped; macule in discal cell hourglass-shaped or with distal edge convex and proximal edge concave, about 1/4 distance from distal end (proximad of origin of vein  $CuA_1$ ); fringe brown proximad, whitish distad.

Dorsal hindwing brown with golden-orange iridescence; proximal 2/3 overscaled with long ochreous and brown setiform scales caudad of vein  $Sc+R_1$  extending nearly to termen along vein 2A; prominent opaque yellow-orange postmedial macules in  $Rs-M_1$ ,  $M_1-M_3$ ,  $M_3-CuA_1$ , and  $CuA_1-CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1-M_3$  divided by thin line of brown, that in  $Rs-M_1$  slightly offset proximad with distal portion over proximal 1/4 of macule in  $M_1-M_3$ ; prominent yellow-orange macule at distal end of discal cell; fringe brown proximad, white distad.

Ventral forewing dull dark brown (nearly black); costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with orange giving orange-brown aspect, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3-CuA_1$ , narrowing to vein  $CuA_2$ ; discal cell moderately overscaled with orange flat and setiform scales; macules as on dorsum, that in  $CuA_2-2A$  pale yellow.

Ventral hindwing entirely overscaled with orange giving orange-brown aspect except sparser on both sides of vein 2A, and as paler postmedial macules and a small vague macule at distal end of discal cell.

Dorsal head black with mixture of ochreous and greenish setiform scales, white spots just behind antennae, white behind and beneath eye; dorsal palpi mixture of black, ochreous, and greenish setiform scales, pale ochreous on sides with interspersed black, white on venter, black on inner surface, 3rd segment black with a few pale yellow-orange scales, barely extending beyond scales of 2nd segment; antennae 49% of costal length, shaft black on dorsum, checkered narrowly with pale yellow on venter, club 33% of length of shaft, dorsal club black, ventral club ochreous and whitish, nudum red-brown becoming darker at tip, 11 (n=2), 12 (n=6), or 13 (n=5) segments; dorsal thorax ochreous-brown with green iridescence especially centrally; ventral thorax ochreous-orange with green iridescence; legs brown proximad, orange distad with long ochreous setiform scales especially proximad, protibia not spined, red-brown epiphysis extending distad to barely overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen dark brown, indistinctly gray at segments, long olive setiform scales cephalad; ventral abdomen pale yellow.

Genitalia (Fig. 64, 77) - uncus short, hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, well-separated from and barely shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, slightly broader than uncus in middle; tegumen thin in lateral view, broad in dorsal view and flaring



cephalad, ventral arm combining with dorsal arm of saccus, this combined structure broadest and bent in its middle; anterior arm of saccus long and thin, straight, about 1.6 times length of uncus and dorsal portion of tegumen, narrow in ventral view and tapering gradually to blunt cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe triangular caudad with short pointed process oriented caudad, interior surface with curved row of small and sharply pointed teeth, sacculus relatively narrow, ventral edge of valva prominently concave in middle; aedeagus straight, tubular, long, about 1.7 times length of valva, caudal end slightly expanded, blunt, small triangular titillator on right side just cephalad of caudal end; vesica with cornuti including a flexible spinulose pad, a large heavily sclerotized and sharply pointed spike, and a minute sclerotized spike.

**Female** (Fig. 15-16) - forewing length = 16.7, 17.8 mm (n=2, from Sinaloa and Sonora, Mexico); forewing with pointed apex, termen convex (more so than on male); hindwing convex (more so than on male), lobate at tornus; dorsal forewing brown, duller than on male with little iridescence; proximal 1/2 costa orange; sparse orange overscaling in base of discal cell and  $CuA_2-2A$ ; orange overscaling of flat and setiform scales in middle 1/2 of anal cell; opaque yellow-orange macules as follows: subapical in mid  $R_3-R_4$  and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, increasing in size caudad, more or less aligned and perpendicular to costa; submarginal in  $M_1-M_2$  and  $M_2-M_3$ , small, nearly 2/3 distance to termen from bases of cells and offset distad from subapical macules, quadrate to triangular, that in  $M_1-M_2$  absent on one specimen (of 2 examined); postmedial in  $M_3-CuA_1$ , quadrate, 1/3 distance from base;  $CuA_1-CuA_2$ , quadrate or curved (distal edge concave, proximal edge convex), largest, distad of origin of  $CuA_1$ , centered under proximal edge of macule in  $M_3-CuA_1$ , completely overlapping macule in  $CuA_2-2A$  that is chevron shaped (anterior portion may be poorly developed); macule in discal cell hourglass-shaped, about 1/4 distance from distal end; fringe brown proximad, gray distad.

Dorsal hindwing brown without iridescence seen on male; proximal 2/3 overscaled with long ochreous and brown setiform scales caudad of vein  $Sc+R_1$  extending nearly to termen along vein 2A; prominent opaque yellow-orange postmedial macules in  $Rs-M_1$ ,  $M_1-M_3$ ,  $M_3-CuA_1$ , and  $CuA_1-CuA_2$ , these more or less quadrate, separated by brown veins, that in  $M_1-M_3$  divided by thin line of brown, that in  $Rs-M_1$  offset proximad with distal edge over center of macule in  $M_1-M_3$ ; yellow-orange macule at distal end of discal cell; fringe brown proximad, gray distad becoming white distad caudad of mid-cell  $CuA_2-2A$ .

Ventral forewing dull very dark brown (nearly black); costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with orange giving orange-brown aspect, entirely filling costal, subcostal, radial, and medial cells, distad of macule in  $M_3-CuA_1$ , narrowing to vein  $CuA_2$ ; discal cell sparsely overscaled with orange flat and setiform scales; macules as on dorsum except macule in  $CuA_2-2A$  broader and pale yellow.

Ventral hindwing entirely overscaled with orange giving orange-brown aspect except sparser on both sides of vein 2A, and as pale yellow-orange postmedial macules and a vague macule at distal end of discal cell.

Dorsal head black with mixture of black, white, and ochreous setiform scales, some with greenish iridescence, white spots just behind antennae, white behind eye becoming ochreous ventrad; dorsal palpi mixture of black and ochreous setiform scales, pale ochreous on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae 47% of costal length, shaft black on dorsum, checkered broadly with whitish on venter, club 40% of length of shaft, dorsal club black, ventral club white and pale ochreous, nudum red-brown becoming darker at tip, 14 (n=1) or 15 (n=1) segments; dorsal thorax ochreous with green iridescence especially centrally; ventral thorax ochreous and pale blue; legs brown proximad, ochreous-brown distad with long ochreous and pale blue setiform scales especially proximad, protibia not spined, red-brown epiphysis long, extending distad to overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; abdominal color not noted.

Genitalia (Fig. 89) - lamellae quadrate, caudal edge of lamella postvaginalis excavate centrally into broad and shallow U-shape, lamella antevaginalis narrower than lamella postvaginalis, shallowly excavate centrally, ostium bursae about twice as broad as deep; ductus bursae long (3.6 mm), relatively straight (ventral and lateral views) antrum that is complexly sclerotized as a number of apparent longitudinal plates, ductus bursae expanded prominently and asymmetrically to the left cephalad, convoluted and transversely and horizontally wrinkled, largely membranous, but with some sclerotization especially

as a conspicuous left lateral pouch-like structure; corpus bursae elongate, about 3 times as long as broad, prominently wrinkled longitudinally.

**Types.** Holotype male with the following labels: white, printed - / MEXICO: SONORA: / Mpio. Yecora / Hwy. 16, km 261 / barranca at W end Mesa / Campaño, 48 km E Tepoca / 24 July 1997 / Andrew D. Warren /; red, printed - / HOLOTYPE / *Onespa brockorum* / Austin & A. Warren /, deposited at MZFC. Paratypes: **MEXICO:** Sinaloa; Durango-Villa Union Hwy. 40, 6500', 29 April 1966, *leg.* P. Hubbell (1 male; AMNH); Loberas Summit, 5 mi. NE Potrerillos, 1820 m, parkland forest, 20 August 1973, *leg.* L. D. and J. Y. Miller (1 female, SRS #4453; MGCL); **MEXICO:** Sonora; 6 mi E San Jose de Piñas, August 1967, *leg.* P. Hubbell (1 male; AMNH); Trinidad-Yecora Road, [Mesa Grande], 10 [actually about 5-6] mi. E [NW] of Yecora, *leg.* J. P. Brock, 21 July 1985 (2 males, SRS #1852, #2686; JPBC), 22 July 1985 (1 female, SRS #1853; JPBC), 28 July 1987 (1 male; JPBC), 29 July 1987 (1 male; JPBC); Mpio. Yecora, Hwy. 16, km 261, barranca at W end Mesa Campaño [48 km E Tepoca], 23 July 1997, *leg.* A. D. Warren (1 male; ADWC), 24 July 1997, *leg.* A. D. Warren (7 males; ADWC), 24 July 1997, *leg.* J. P. Brock (3 males; JPBC), 25 July 1997, *leg.* J. P. Brock (1 female; JPBC), 22 August 1998, *leg.* J. P. Brock (1 male; JPBC). Paratypes are in the collections of MZFC, MGCL, ADWC, and JPBC.

**Additional record.** **MEXICO:** Sonora; barranca, Ruta 16, km 261-262, 7 August 2005, photographs by Kim Davis and Mike Stangeland (Warren et al. 2009).

**Type locality.** MEXICO: Sonora; Mpio. Yecora, Hwy. 16, km. 261, barranca at W end of Mesa Campanero [48 km east of Tepoca] at an elevation of 1600m.

**Etymology.** We take great pleasure in naming this species in honor of Jim and Joan Brock of Tucson, Arizona. Jim brought the existence of this species to the attention of the late Stephen R. Steinhauser, who had planned to name it after him, and Jim has been present during essentially all known encounters with this taxon in Sonora. Joan, a professional author in her own right, has unselfishly supported numerous lepidopterists with generous hospitality during their visits to Tucson.

**Distribution and phenology.** To date, *Onespa brockorum* is known only from Sonora and Sinaloa in northwestern Mexico. Adults have been found from late April through August in canyons at about 1600m elevation in Sonora, and the specimens from Sinaloa were taken between 1820 and 1970m. As noted above under *O. gala*, records of *Onespa gala* from Sinaloa (Stanford and Opler 1993) refer to this species; while the details of the record of *O. gala* plotted from the state of Durango by Stanford and Opler (1993) are unknown; *Onespa* from Durango are most likely to represent *O. brockorum*.

**Biological notes.** Various grasses (Poaceae) occur at the type locality of *O. brockorum*, one of which likely represents the larval foodplant; no *Chusquea* was observed (ADW, pers. obs.). Males guard perches on tips of vegetation 0.5 to 3 m above the ground, at least from 10:30 to 15:40 h., in riparian corridors and other sunny areas within pine-oak forest.

**Diagnosis and discussion.** *Onespa brockorum* is very similar to *O. gala* and has historically been identified as such. The former is more brightly colored than *O. gala* and the macules are broader and more orange. The ventral hindwing of *O. brockorum* has an orange-brown aspect unlike the olive-brown venter of *O. gala*. Male genitalia of *O. brockorum* have a less robust uncus than *O. gala*, a shorter tegumen and saccus, a more pointed caudal end of the valva, and a heavily sclerotized small spike in the vesica in addition to the robust one. Females have narrower and less rounded lamellae, a lamella antevaginalis that is less excavate caudad, and a ductus bursae that is more convoluted cephalad.

***Onespa nakamura* Austin and A. Warren, new species**  
(Fig. 17-18, 66, 78)

**Description. Male** (Fig. 17-18) - forewing length = 18.2 mm (n=1, holotype); forewing produced to pointed apex, termen slightly convex, no stigma or brand; hindwing convex, weakly lobate at tornus;

dorsal forewing dark brown with red-brown iridescence; proximal 1/2 costa bright red-brown, this color extending as overscaling of setiform scales into adjacent anterior portion and base of discal cell; sparse paler (more yellowish) red-brown overscaling in base of  $CuA_2-2A$ ; yellow-orange overscaling of setiform scales in middle 1/3 of anal cell; translucent pale yellow-orange macules (edged distad with shining gold color) as follows: subapical near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, that in  $R_5-M_1$  about 2 times size of that in  $R_4-R_5$ ; postmedial in  $M_3-CuA_1$ , trapezoidal (horizontally), 1/3 distance from base; subquadrate in  $CuA_1-CuA_2$ , largest, distal edge slightly concave, centered under origin of  $CuA_1$ , overlapping proximal 1/3 of macule in  $M_3-CuA_1$ ; discal cell, hourglass shaped, about 1/4 distance from distal end, overlapping proximal 1/3 of macule in  $CuA_1-CuA_2$  (just proximad of origin of vein  $CuA_1$ ); opaque yellow-orange macule just distad of center of posterior 1/2 of  $CuA_2-2A$ ; much smaller opaque yellow-orange macule in anterior 1/2 of  $CuA_2-2A$ , just distad of center of macule in  $CuA_1-CuA_2$ ; right wing with minute opaque yellow-orange macule in mid-cell  $R_3-R_4$ ; fringe dark gray-brown, slightly paler distad.

Dorsal hindwing dark brown; proximal 2/3 overscaled with long brown and a few ochreous scales caudad of vein  $Sc+R_1$ , nearly reaching termen along vein 2A; opaque, small, irregularly-shaped yellow-orange postmedial macules in  $Rs-M_1$ ,  $M_1-M_3$  (a few scales),  $M_3-CuA_1$ , and  $CuA_1-CuA_2$ ; fringes dark gray-brown, pale gray distad.

Ventral forewing brown, paler than on dorsum; costa, apex, and outer margin overscaled with bright red-brown, entirely filling costal, subcostal, radial, and medial cells, latter occurring distad of macule in  $M_3-CuA_1$ , narrowing to termen at vein  $CuA_2$ ; anterior central 1/3 of discal cell overscaled with yellow-orange flat and setiform scales, these mixed with a few red-brown scales; anal cell gray; macules as on dorsum except macule in discal cell and  $CuA_1-CuA_2$  outlined with yellow-orange and yellow macule in  $CuA_2-2A$  expanded across entire cell, making macule largest in venter, extending slightly proximad and distad of edges of macule in  $CuA_1-CuA_2$  but with anterioproximal portion excavate for about 1/4 width of macule.

Ventral hindwing entirely bright red-brown except much sparser on both sides of vein 2A, and as vaguely paler (yellow overscaled with red-brown) macules including medial in  $Sc+R_1-Rs$ , a series of small postmedial macules from  $Rs$  to 2A, and a small macule at distal end of discal cell.

Dorsal head mixture of gray and red-brown scales, ventral head whitish becoming dull red-brown caudad; dorsal palpi dark gray, red-brown on outer surface, black on inner surface, ventral palpi gray distad and red-brown proximad; antennae 52% of costal length, shaft black on dorsum, checkered with yellow-orange on venter, yellow-orange becoming broader distad, club 29% of length of shaft, dorsal club black, ventral club yellow-orange, nudum red-brown, 13 segments; dorsal thorax red-brown on sides, gray with green iridescence centrally cephalad and pale yellow-gray caudad; ventral thorax mixture of gray and red-brown; legs red-brown with long setiform scales, ochreous proximad, red-brown distad, protibia not spined, red-brown epiphysis extending distad to barely overlap proximal portion of tarsus, mesotibia with medium length spines, pair of spurs distad, outer about 1/2 length of inner, metatibia spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black, sparse ochreous at segments; ventral abdomen and caudal end red-brown.

Genitalia (Fig. 66, 78) - uncus relatively long, hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, much broader than uncus in middle; tegumen thin in lateral view, broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure broadest and bent ventrad of its middle; anterior arm of saccus long and thin, mostly straight, about 1.1 times length of uncus and dorsal portion of tegumen, moderately broad in ventral view and tapering gradually to pointed cephalic end; valva simple, little differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe tapered to elongate, triangular, and sharply pointed caudal end, sacculus narrow, ventral edge of valva concave in middle; aedeagus straight, tubular, moderately long, about 1.1 times length of valva, caudal end slightly expanded with a short triangular projection caudad from its ventral surface, elongate triangular titillator on right side cephalad of caudal end, ventral surface with still larger and more elongate triangular keel-like titillator; vesica with cornuti including an elongate flexible spinulose pad and two large heavily sclerotized and sharply pointed spikes.

**Female** - unknown.

**Type.** Holotype male with the following labels: white, printed - / COSTA RICA: Prov. San José / Bajo la Hondura, 1150-1450m / 10°03'37"N, 83°58'55"W / 13. vi. 2005 / I. Nakamura leg. /; white, handprinted - / Palpus attached /; white, handprinted - / n=7/7 / not spined / no brand /; white, handprinted / Not Turesis /; white, printed and handprinted - / Genitalic Vial / GTA-14033 /; red, printed - / HOLOTYPE / *Onespa nakamura* / Austin & A. Warren /, deposited at MGCL. Known only from the holotype.

**Type locality.** COSTA RICA: San José Province; Bajo la Hondura, 1150-1450m, 10°03'37"N, 83°58'55"W.

**Etymology.** It is our pleasure to name this species after Ichiro Nakamura who generously and graciously allowed us to study his collections of Hesperidae in depth.

**Distribution and phenology.** The species is known at present only from the holotype taken in June.

**Diagnosis and discussion.** *Onespa nakamura*, discovered as a single male among a collection from Costa Rica, prompted this re-examination of *Onespa*. Color and pattern of *O. nakamura* are immediately reminiscent of *Onespa nubis* and *O. nakamura* is the largest species of the genus. Affinity was further strengthened by the absence of a stigma and morphology of the male genitalia. These latter, while within the general gestalt of its congeners, differ from all by the more elongate uncus, gnathos, and valva and the prominent keel-like titillator on the ventral surface of the aedeagus. *Onespa nakamura* shares with *O. nubis* the presence of two prominent cornutal spikes and an elongate flexible cornutus. *Onespa gala* has a single spike and *O. brockorum* has a small spike in addition to the robust one; both have a much smaller flexible cornutus than either *O. nubis* or *O. nakamura*. The right lateral titillator on *O. nakamura* is large. This structure is much smaller on *O. gala* and *O. brockorum* and absent on *O. nubis*. In addition, *Onespa nakamura* has a triangular keel-like titillator on ventral surface of the aedeagus, a structure absent on its congeners.

In the presence of tibial spines, *O. nakamura* differs from the other three species included within *Onespa*. That character, generally a useful taxonomic trait among hesperiines (e.g., Evans 1955), is not here considered to exclude *O. nakamura* from the genus. Other traits, including color and pattern, absence of a stigma, and especially genital morphology are consistently within the concept of *Onespa* and not with other potentially related genera (see general discussion below). Discovery of a female of *O. nakamura* and examination of her genitalia, however, are essential for its unequivocal generic association.

## Discussion and Diagnosis of *Onespa*

Burns (1994b) has shown that genital morphology, including seemingly unimportant structures, may serve to affiliate myriad taxa. Within *Onespa*, there are several immediately obvious aspects of genital morphology that point to a compact group of species. The four species now included in the genus share an undivided uncus that is at least weakly lobate caudad and well separated from and slightly longer than the divided gnathos; a relatively broad tegumen flaring widely to its ventral arms cephalad and combining with the dorsal arms of the saccus to form an obviously bent structure; a long saccus that narrows gradually cephalad; a relatively simple valva constricted near the center of its ventral edge with a produced (sometimes pointed) caudal end and a dorsally oriented triangular caudal process near the end of the ampulla; a long tubular aedeagus; cornuti including a flexible spinulose pad and at least one prominent spike. This common suite of characters is not seen in combination within other genera.

The characters that define *Onespa* exhibit a number of, often non-accordant, trends among its species, especially with respect to their genitalia. *Onespa gala* and *O. brockorum* have short valvae; these are longer on *O. nubis*, and very long on *O. nakamura*. The caudal end of the valva is rounded on *O. gala*, somewhat produced and pointed on *O. brockorum*, elongate and bluntly pointed on *O. nubis*, and yet more elongate and sharply pointed on *O. nakamura*. The saccus is elongate, but very thin on *O. nubis*, *O. gala*, and *O. brockorum* and broader on *O. nakamura*. The uncus is short on *O. nubis*, longer on *O. gala* and *O. brockorum*, and very long on *O. nakamura*. The aedeagus is notably elongate on *O. gala*, *O. brockorum*, and *O. nubis* and shorter and stouter on *O. nakamura*. *Onespa nubis* has no titillator; on *O. gala* and *O. brockorum* the titillator is short and triangular; and on *O. nakamura* the titillator on the right side is large and there is an additional keel-like titillator on the ventral surface of the aedeagus. *Onespa nubis*



and *O. nakamura* have two large spike-like cornuti, *O. gala* has one, and *O. brockorum* has a large spike-like and a small spine-like cornuti (Fig. 75-78). The flexible cornutus is elongate on *O. nubis* and *O. nakamura*; this is shorter on *O. gala* and *O. brockorum*.

Female genitalia also exhibit varied characters within the envelope described by *Onespa*. They are united by their relatively broad sterigma and an elongate and complexly sclerotized ductus bursae with a prominent pouch cephalad. The sterigma is trapezoidal on *O. nubis* and roughly quadrate on *O. gala* and *O. brockorum*. The lamella postvaginalis has four lobes on its caudal edge on *O. nubis* and only two on *O. gala* and *O. brockorum*. The lamella antevaginalis is deeply excavate on *O. nubis*, moderately excavate on *O. gala*, and weakly excavate on *O. brockorum*.

Steinhauser (1974) distinguished *Onespa* by its spineless tibiae, absent stigma, quadrate palpi, and length of its nudum. These superficial traits in combination largely delimit *Onespa*, except for tibial spines on *O. nakamura*. As pointed out by Burns (1992b), however, external characters historically used to delimit genera among hesperiines (e.g., Godman and Salvin 1879-1901, Evans 1955) may not sufficiently serve that purpose. Such characters, including development of a stigma, form of the palpi, and structure of the apiculus considered largely inviolate within genera have been shown to be frequently otherwise (Burns 1982, 1990, 1992b, 1994a; MacNeill 1993; MacNeill and Herrera 1998, see Warren et al. 2009). Within *Onespa* as here defined, tibial spines joins those characters that are not necessarily genus-specific (but see Evans' 1955 concept of *Librita* Evans, 1955). All told, these and other superficial traits, including color and pattern, while serving as informative first cuts, may exhibit more plasticity at the generic level than traditionally assumed.

*Onespa* has 2-3 subapical macules on the forewing, two of the four species have submarginal macules in  $M_1$ - $M_2$  and  $M_2$ - $M_3$ , all have postmedial macules including in cell  $CuA_2$ -2A, and a macule at the end of the discal cell. The ventral forewing of *Onespa* has a uniformly-colored red-brown or olive-colored costa extending to the apex and broadly caudad to vein  $CuA_1$  and then narrowly into cell  $CuA_1$ - $CuA_2$ . The ventral hindwing is similarly overscaled including over the postmedial macules. There is a vague pale macule at the distal end of the discal cell on this wing that also occurs on the dorsum of *O. brockorum* and on some *O. nubis* and *O. gala*. The dorsum of *O. nubis* and *O. gala* are similar; *O. brockorum* also resembles those, but has broader macules; and *O. nakamura* has an enlarged macule in  $CuA_1$ - $CuA_2$ . *Onespa* exhibits sexual dimorphism with females having paler and slightly larger macules than males, those of *O. nubis* being white on the forewing.

Superficial characters of *Onespa* variably resemble those of other hesperiine genera as noted by Steinhauser (1974). The absence of a stigma is shared with several apparently related taxa, including *Buzyges* Godman, 1900, some *Poanes*, *Atrytone* Scudder, 1872, *Anatrytone* Dyar, 1905, *Quasimellana* Burns, 1994, and *Problema* Skinner and Williams, 1924. The lack of tibial spines on all except *O. nakamura* is common with only *Problema* and *Atrytone*. The length of the nudum of *Onespa*, ranging from 11 to 15 segments, embraces those of the aforementioned genera except *Atrytone* and *Anatrytone* that have fewer segments (Evans 1955). Superficially, *Onespa* resemble taxa of other genera. The dorsum of *O. nubis*, especially has a gestalt of a number of other higher elevation taxa from the Rocky Mountains southward into central Mexico, including *Paratrytone snowi* (W. H. Edwards, 1877), *Paratrytone aphractioia* Dyar, 1914, *Poanes monticola* (Godman, 1900), and *Poanes melane* (W. H. Edwards, 1869). Overall, however, the placement and orientation of their pattern elements differ from those seen on *Onespa*.

In their genitalia, *Onespa* exhibits its cohesiveness and difference from other hesperiines. Male genitalia of *Onespa*, previously illustrated for *O. nubis* (Steinhauser 1974), have a simple valva with a produced and often pointed caudal end and a dorsal triangular process. This configuration resembles the valvae of *Buzyges idothea* Godman, 1900, *Pamphila rolla* Mabille, 1883, *Poanes benito* Freeman, 1979, *Hesperia librita* Plötz, 1886, and *Augiades heras* Godman, 1900 (see Evans 1955 and below). All those taxa also have titillators on the aedeagus and prominent spike-like cornuti and variably-developed flexible cornuti (see below). The aedeagi of all, however, are short and stout, differing from the elongate aedeagus of *Onespa*. Both *H. librita* and *A. heras* have a well-developed stigma. Female genitalia of *Onespa*, with their very long and sclerotized antrum and pouch-like structure near the cephalic end of the ductus bursae, differ from the shorter structures and absent pouch on potentially related taxa. Among hesperiine taxa critically examined, a pouch, probably not homologous, has been seen only in *Hylephila* Billberg, 1820 (MacNeill and Herrera 1998).

The placement of *Onespa* within the “*Hesperia* subgroup” of Hesperinae by Steinhauser (1974) is not contradicted by its morphology. Its relationships within this diverse assemblage in what is recognized as the tribe Hesperini, however, is conjectural. It was placed by Warren et al. (2008a) after *Buzyges* (Godman, 1900) and before *Poanes* and by Warren et al. (2009) after *Buzyges* and before *Paratrytone*. Among hesperiines, there are several taxa with a combination of an undivided uncus, simple valvae, and spike-like cornuti besides *Onespa*. As previously noted, these include *Buzyges idothea* Godman, 1900, two taxa recently excluded from *Poanes* (*Pamphila rolla* Mabilie, 1883, *Poanes benito* Freeman, 1979) by Burns (1992a), and *Librita librita* (Plötz, 1886). *Buzyges*, *Pamphila rolla*, and *Poanes benito* are similar to *Onespa* in lacking a stigma, but all have tibial spines. *Librita*, as currently composed, has both tibial spines on some species and a stigma. The genitalia of those species, however, have a poorly developed or absent flexible cornutus, a shorter saccus, and a shorter and stouter aedeagus. Female genitalia of those taxa are very different from those of *Onespa*, especially with a shorter antrum without the apparent complex sclerotized plates and the cephalic portion of the ductus bursae is far less asymmetrical without the sclerotized pouch seen on *Onespa*. The expanded concept of *Onespa* reaffirms its distinctness that led to its original proposal. The genital morphology not only defines a compact generic entity, but also suggests affinity with *Buzyges* and perhaps *Librita*.

*Onespa* is part of a higher elevational fauna of hesperiines in the northern neotropics. As noted by Steinhauser (1974), *O. nubis* apparently utilizes a *Chusquea* bamboo as a larval foodplant in El Salvador. In contrast, *Onespa gala* and *O. brockorum* occur in montane settings apparently devoid of *Chusquea* (ADW, pers. obs.), but rich in a variety of grasses.

#### Key to male *Onespa*

1. Large, forewing length >18 mm, with mesotibial spines ..... ***O. nakamura*, new species**
- Smaller, forewing length <18 mm, without mesotibial spines ..... **2**
- 2(1). Ventral hindwing red-brown ..... ***O. nubis* Steinhauser**
- Ventral hindwing not red-brown (olive- to orange-brown) ..... **3**
- 3(2). Dorsal forewing macules narrow and not forming continuous postmedial band, ventral hindwing olive-brown, single rigid cornutus ..... ***O. gala* (Godman)**
- Dorsal forewing macules broad and forming nearly continuous postmedial band, ventral hindwing orange-brown, two rigid cornuti ..... ***O. brockorum*, new species**

#### Key to female *Onespa* (female of *O. nakamura* unknown)

1. Macules of forewing white (except yellow in CuA<sub>2</sub>-2A), ventral hindwing red-brown .... ***O. nubis* Steinhauser**
- Macules of forewing pale to medium orange, ventral hindwing not red-brown (olive- to orange-brown) ..... **2**
2. Dorsal forewing macules narrow and not forming continuous postmedial band, ventral hindwing olive-brown ..... ***O. gala* (Godman)**
- Dorsal forewing macules broad and forming nearly continuous postmedial band, ventral hindwing orange-brown ..... ***O. brockorum*, new species**

#### *Buzyges* Godman, 1900

**Type species:** *Buzyges idothea* Godman, 1900, by monotypy.

The investigation leading to a revision of the genus *Onespa* above included examination of similar and potentially allied taxa. Among these was *Buzyges* Godman, 1900, that was listed adjacent to *Onespa* in recent phylogenetic reviews of hesperiids (Warren et al. 2008a, 2009). *Buzyges* was proposed for a superficially rather odd species of skipper, *Buzyges idothea* Godman, 1900, known only from Costa Rica (Godman

and Salvin 1879-1901). That genus has remained monotypic since its description (Evans 1955, Mielke 2005a), based upon those superficial traits that seemingly set it apart from other taxa of Hesperinae. Genital morphology and other traits, however, suggest that at least three additional species, one undescribed, should be included. Here, *Buzyges* and its newly subsumed species are described in detail and the genus is recharacterized to encompass two new combinations and one new species. The format of descriptions of *Buzyges* and of subsequently treated genera parallels that of *Onespa* for ease of comparison.

**Description.** Palpi subquadrate, shaggy, 3rd segment robust, nearly erect, exceeding scales of second segment. Antennae more than 1/2 costa on males (52-63%), about 1/2 costa on females (48-55%); club stout, more than 1/3 shaft (34-44% on males, 43-48% on females), bent to constricted apiculus beyond thickest part; nudum varies from 11 to 13 segments, subequally divided between club and apiculus (4-5 segments on club); shaft black above, usually not checkered, black and checked with yellow or yellow-orange on venter; nudum red-brown.

Wings somewhat produced; forewing apex 1.3 times length along vein 2A; hindwing about equally long at veins Sc+R<sub>1</sub>, 2A, and CuA<sub>1</sub>; 3A 1.1-1.2 times length of Sc+R<sub>1</sub>. No secondary sex characters in male. Hindwing origin Rs nearer to cell end than base. Forewing origin CuA<sub>2</sub> nearer to origin of CuA<sub>1</sub> than to base of wing. Sexual dimorphism prominent. Wings brown with yellow-orange (male) or yellowish and/or whitish (female) maculation.

Meso- and metatibiae spined (smooth on one species) with long fringes of setiform scales on both tibia and femur, especially dense and long on metafemur; mesotibiae with one pair of spurs, metatibiae with two pairs; outer spur in each pair 1/2-3/4 length of inner spur.

Male genitalia with gnathos bifid, arms slender and connivent, uncus narrow, bluntly pointed to slightly bilobed at end, about width of gnathos in dorsal view, prominently longer than gnathos; separation of gnathos and uncus in lateral view moderately deep. Tegumen flaring cephalad, ventral arm with dorsal arm of saccus combining into a structure bent below its middle, anterior arm of saccus moderately long, narrowing to a pointed or bluntly curved cephalic end in ventral view. Valvae simple and unarticulated, with costa/ampulla relatively straight and undifferentiated between themselves and harpe, ampulla with small dorsal triangular process caudad, harpe with caudal end pointed. Aedeagus broad, relatively short (1.1-1.5 times length of valva), triangular process (titillator) on right side near caudal end, with complex cornuti consisting of two heavily sclerotized structures and a flexible, lightly sclerotized and sometimes spinulose pad.

Female genitalia characterized by a short (1.4-2.2 mm), sclerotized, and centrally constricted ductus bursae, curved dorsad, and shorter than corpus bursae. Lamella antevaginalis very broad and slightly excavated caudad; lamella postvaginalis also very broad with shallow caudal indentation; ostium bursae broad and shallow, twice as broad as deep. Corpus bursae transversely wrinkled caudad, lightly or more prominently wrinkled longitudinally, no signa.

**Distribution and richness.** *Buzyges*, here considered to include four species, occurs from west-central (Jalisco) to southwestern (Oaxaca) Mexico as well as in Costa Rica and Panama. Species occur in montane forested habitats from at least 1150 m to over 1800 m.

Further discussion and diagnosis of the genus is deferred until after its component species are characterized.

### ***Buzyges idothea* Godman, 1900**

(Fig. 19-24, 67, 79, 90)

*Buzyges idothea* Godman, 1900. Type locality: COSTA RICA, Rio Sucio, Irazu; holotype male (Fig. 19-20) in Godman and Salvin collection at BMNH.

**Description. Male** (Fig. 19-22) - mean forewing length = 15.2 mm (14.8-15.6 mm, n=7; from Costa Rica); forewing apex pointed, termen convex; hindwing termen convex cephalad, slightly concave caudad before short tornal lobe; dorsum very dark brown (nearly black); dorsal forewing with no stigma or brand; yellow-orange overscaling in costal cell, distad in cell Sc-R<sub>1</sub>, base of costal cell, and cell Sc-R<sub>1</sub> overscaled with red-orange, yellow-orange overscaling in 2nd 1/4 from base in anal cell; opaque yellow-orange subapi-

cal macules in  $R_3$ - $R_4$ ,  $R_4$ - $R_5$ , and  $R_5$ - $M_1$ , all more or less rectangular, divided by brown veins, that in  $R_5$ - $M_1$  largest; postmedial opaque yellow-orange macules near bases of cells  $M_2$ - $M_3$  (small and ill-defined) and  $M_3$ - $CuA_1$  (rectangular); medial yellow-orange macule in discal cell, doubled but undivided, rectangular anterior portion about 2/3 width of and completely overlapped by posterior portion, these conjoined with and overlapped by yellow-orange macules in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A, that in  $CuA_1$ - $CuA_2$  largest, proximal edge in line with proximal edge of macule in discal cell and extending distad of that macule but not overlapping macule in  $M_3$ - $CuA_1$ , that in  $CuA_2$ -2A decreasing in width caudad and not reaching vein 2A but with sparse orange overscaling extending proximad from proximocaudal corner to overlap overscaling in anal cell; fringe mixture of orange and pale brown scales.

Dorsal hindwing grayish along costal margin; overscaled with grayish (proximad) and pale orange setiform scales from mid-discal cell caudad beyond vein 2A, extending nearly to termen along vein 2A; opaque yellow-orange postmedial macules in  $Rs$ - $M_1$ ,  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ , and  $CuA_1$ - $CuA_2$ , that in  $Rs$ - $M_1$  more or less trapezoidal mixed with dark brown scales cephalad, that in  $M_1$ - $M_3$  largest, more or less quadrate, that in  $M_3$ - $CuA_1$  quadrate, overlapped completely by macule in  $M_1$ - $M_3$ , that in  $CuA_1$ - $CuA_2$  extending caudad about 1/2 cell width and completely overlapped by macule in  $M_3$ - $CuA_1$ ; yellow-orange macule at distal end of discal cell; fringe entirely orange.

Ventral forewing red-brown in costal and subcostal cells (latter overscaled with black), at distal end of discal cell, and at apex distad of end of discal cell to vein  $M_3$ , then narrowing to vein  $CuA_2$ ; veins at distal end of discal cell black; macules of dorsum repeated but yellower, subapical macules and postmedial macule in  $M_2$ - $M_3$  overscaled with red-brown; remainder of wing black; fringe red-brown, dull yellow-orange distad caudad of vein  $CuA_2$ .

Ventral hindwing mottled red-brown and tan, palest beneath postmedial macules; tan in costal cell except for red-brown costal margin, proximal and postmedial in  $Sc+R_1$ - $Rs$ , and marginal in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and  $CuA_2$ -2A; posterior  $CuA_2$ -2A and anterior 2A-3A black, sparsely overscaled with tan; minute dark red-brown to black macule in base of  $M_1$ - $M_3$ , at and frequently straddling veins at origin of  $M_1$ ; fringe red-brown, pale orange caudad of  $CuA_2$ .

Dorsal head brown with orange overscaling; palpi mixture of largely pale gray-brown with greenish iridescence, red-brown caudad, and a few black scales, becoming slightly paler on sides and venter, inner surface dark gray, 3rd segment black, stout, slightly exceeding scales of 2nd segment; antennae very long (63% of costal length), entirely black on dorsum, venter black checked with yellow, the yellow broadening distad, club relatively long (37% of length of shaft), shining yellow (showing metallic green iridescence in sunlight), nudum red-brown, distal segment brown, 11 (n=2) or 12 (n=2) segments; dorsal thorax black with ochreous and iridescent greenish setiform scales centrally, red-brown setiform scales laterad; ventral thorax black, overscaled with ochreous setiform scales, pectus pale ochreous, legs red-brown distad, black proximad with long ochreous setiform scales, protibia smooth, red-brown epiphysis short, reaching junction with tarsus, mesotibia spined, single pair of spurs, outer 2/3 length of inner, metatibia spined, two pairs of spurs, outer about 3/4 length of inner; dorsal abdomen black overscaled with ochreous setiform scales, caudal end yellow-orange; ventral abdomen yellow-orange.

Genitalia (Fig. 67, 79) - uncus short, weakly hooked caudad in lateral view, entire and narrowing to bluntly pointed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view; tegumen narrow in lateral view, narrow in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent ventrad of its middle; anterior arm of saccus moderately long and thin, straight, about length of uncus and dorsal portion of tegumen, moderately broad caudad in ventral view, narrowing gradually to point cephalad; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe curved and produced caudad to another small and pointed triangular process, sacculus narrow, ventral edge of valva prominently concave cephalad of middle; aedeagus straight, stout, about 1.4 times length of valva, caudal end slightly expanded, sharply and caudally pointed triangular titillator on right side caudad; vesica with cornuti including a small and lightly sclerotized flexible spinulose pad, a heavily sclerotized thorn-like structure, and a long heavily sclerotized and sharply pointed spike.

**Female** (Fig. 23-24) - forewing length = 15.3, 15.8 mm (n=2, from Costa Rica); forewing apex pointed, termen convex; hindwing termen convex cephalad, slightly concave caudad before short tornal lobe; dorsum very dark brown (nearly black); dorsal forewing with sparse yellow-orange overscaling in costal cell





**Figure 19-36.** *Buzyges* (full data in text; ds = dorsal surface, vs = ventral surface; scale bar = 10 mm). **19)** *B. idothea*, holotype male, Costa Rica, ds; **20)** same, vs; **21)** *B. idothea*, male, Costa Rica, 10 March 2004, ds; **22)** same, vs; **23)** *B. idothea*, female, Costa Rica, 10 March 2004, ds; **24)** same, vs; **25)** *B. rolla*, male, Panama, 26 August 1976, ds; **26)** same, vs; **27)** *B. rolla*, female, Panama, 26 December 1969, ds; **28)** same, vs; **29)** *B. benito*, holotype male, Jalisco, Mexico, ds; **30)** same, vs; **31)** *B. benito*, male, Oaxaca, Mexico, 24 October 2008, ds; **32)** same, vs; **33)** *B. mellanaformis*, holotype male, Costa Rica, 13 June 2005, ds; **34)** same, vs; **35)** *B. mellanaformis*, paratype female, Costa Rica, 23 October 2006, ds; **36)** same, vs.

and distad in cell Sc-R<sub>1</sub>, yellow-orange overscaling in middle 1/2 of anal cell; translucent white subapical macules in R<sub>3</sub>-R<sub>4</sub>, R<sub>4</sub>-R<sub>5</sub>, and R<sub>5</sub>-M<sub>1</sub>, all more or less rectangular, that in R<sub>5</sub>-M<sub>1</sub> largest; rectangular post-medial opaque pale yellow-orange macule near base of M<sub>3</sub>-CuA<sub>1</sub>; medial opaque yellow-orange macule in discal cell, doubled but undivided, rectangular anterior portion about 3/4 width of and completely overlapped by posterior portion, these overlapped by opaque yellow-orange macules in CuA<sub>1</sub>-CuA<sub>2</sub> and CuA<sub>2</sub>-2A, that in CuA<sub>1</sub>-CuA<sub>2</sub> largest, proximal edge in line with distal edge of macule in discal cell but not overlapping macule in M<sub>3</sub>-CuA<sub>1</sub>, that in CuA<sub>2</sub>-2A decreasing in width caudad and not reaching vein 2A but with sparse orange overscaling extending proximad from proximocaudal corner to overlap overscaling in anal cell; all macules on forewing divided by brown veins; fringe dull olive to vein CuA<sub>2</sub>, then dull pale orange to tornus.

Dorsal hindwing grayish along costal margin; overscaled with grayish (proximad) and pale orange setiform scales from mid-discal cell caudad beyond vein 2A, nearly to termen along vein 2A; opaque yellow-orange (not as pale as on forewing) postmedial macules in Rs-M<sub>1</sub>, M<sub>1</sub>-M<sub>3</sub>, and M<sub>3</sub>-CuA<sub>1</sub>, that in Rs-M<sub>1</sub> vague and mixed with dark brown scales, that in M<sub>1</sub>-M<sub>3</sub> largest, more or less quadrate, that in M<sub>3</sub>-CuA<sub>1</sub> quadrate, overlapped completely by macule in M<sub>1</sub>-M<sub>3</sub>; macules all divided by brown veins; a few yellow-orange scales at distal end of discal cell; fringe pale orange.

Ventral forewing red-brown in costal and subcostal cells (latter overscaled with black), at distal end of discal cell, and at apex distad of end of discal cell to vein M<sub>2</sub>, then narrowing to vein CuA<sub>2</sub>; veins at distal end of discal cell black; macules of dorsum repeated but yellower, subapical macules white, not overscaled as on male; remainder of wing black except brown distad in CuA<sub>2</sub>-2A and in anal cell; fringe red-brown, dull yellow-orange distad caudad of vein CuA<sub>2</sub>.

Ventral hindwing mottled red-brown and tan, palest beneath postmedial macules; costal cell mostly tan except for red-brown costal margin, tan proximad and postmedial in Sc+R<sub>1</sub>-Rs, and marginal in M<sub>3</sub>-CuA<sub>1</sub>, CuA<sub>1</sub>-CuA<sub>2</sub>, and CuA<sub>2</sub>-2A; posterior CuA<sub>2</sub>-2A and anterior 2A-3A black, sparsely overscaled with tan; minute dark red-brown macule in base of M<sub>1</sub>-M<sub>3</sub> at origin of M<sub>1</sub>; fringe red-brown, pale orange caudad of CuA<sub>2</sub>.

Dorsal head brown; palpi largely ochreous-red with greenish iridescence caudad on dorsum and a few black scales, ochreous on sides and venter, inner surface blackish, 3rd segment brown, stout, slightly exceeding scales of 2nd segment; antennae 55% of costal length, entirely black on dorsum, venter black checked with pale yellow, the yellow broadening distad, club long (44% of length of shaft), pale yellow except distad on dorsum, nudum red-brown, distal segment brown, 11 segments (n=2); thorax badly rubbed, pectus ochreous; legs yellow-orange distad, brown proximad clothed with setiform scales especially dense and long on metafemur, protibia smooth, red-brown epiphysis short, reaching junction with tarsus, mesotibia spined, one pair of spurs, outer about 2/3 length of inner, metatibia spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen dark brown with long setiform scales cephalad; ventral abdomen rubbed, perhaps ochreous.

Genitalia (Fig. 90) - lamellae more or less quadrate, caudal edge of lamella postvaginalis excavate centrally into narrow and shallow U-shape, lamella antevaginalis narrower than lamella postvaginalis, shallowly excavate centrally, ostium bursae about twice as broad as deep; ductus bursae sclerotized, broad in ventral view and relatively long (2.1 mm including antrum), slightly constricted in middle, relatively straight in ventral view, slightly curved dorsad in lateral view; corpus bursae broad, about 2 times as long as broad, prominently wrinkled transversely caudad, indistinctly wrinkled longitudinally cephalad.

**Specimens examined.** **COSTA RICA:** Irazu, 6-7000', *leg.* H. Rogers (holotype male; BMNH); **COSTA RICA:** Alajuela Province; Volcan Poas, The Antennas Rd., 2500-2600m, 25 September 2007, *leg.* I. & M. Nakamura (2 males; INIC); **COSTA RICA:** Cartago Province; Ruta 2, km 40, Finca Las Clavales (circa Casamata), 10 September 1986, *leg.* G. & A. Austin (3 males, SRS #3753, 1 female, SRS #3754; MGCL); Cartago, 1899, *leg.* Underwood (1 male, ADW #97-102 [BMNH 4429]); Cartago, *leg.* Underwood (1 female, ADW #97-103 [BMNH 4430]); **COSTA RICA:** Heredia Province; Monte de la Cruz, 2011m, 10°05'08"N, 84°05'14"W, 25 February 2004, *leg.* I. Nakamura (2 males; INIC); **COSTA RICA:** Puntarenas Province; Monteverde, 1400m, 9 March 1998, *leg.* W. A. Haber (1 male; ADWC); **COSTA RICA:** Puntarenas Province; Monte Verde Preserve, 19 May 1985, *leg.* P. A. Opler (1 female; ADWC); **COSTA RICA:** San José Province; Ruta 2, km 105, 26 December 1984, *leg.* G. T. Austin (3 males; MGCL); **COSTA RICA:**

San José Province; San Gerardo de Dota, 2000-2300m, Cordillera Talamanca, 9°32'56"N, 83°49'47"W, 10 March 2004, *leg.* I. Nakamura & K. Nishida (3 males, 1 female; INIC), same locality and collectors, 18 April 2006 (1 male; INIC), same locality, 14 March 2004, *leg.* I. Nakamura (1 male; INIC); **COSTA RICA:** San José Province; Reserva Forestal la Trocha, 1740-1700m, above Cascajal do Coronado, 10°01'17"N, 83°55'02"W, 20 April 2006, *leg.* I. Nakamura (3 males; INIC).

**Distribution and phenology.** This species is known only from Costa Rica at elevations above 1400m (Godman and Salvin 1879-1901, Evans 1955, this study). Specimens here examined suggest a flight through much of the year, but perhaps concentrated from February through May.

**Discussion.** Further consideration of *B. idothea* will be presented below in the context of the entire genus.

***Buzyges rolla* (Mabille, 1883), new combination**

(Fig. 25-28, 68, 80, 91)

*Pamphila rolla* Mabille, 1883. Type locality: Amérique du Sud; holotype in Mabille's collection (Mielke 2005b).

**Description. Male** (Fig. 25-26) - mean forewing length = 14.5 mm (13.6-15.3 mm, n=10; from Costa Rica and Panama); forewing apex pointed, termen slightly convex; hindwing termen convex cephalad, slightly concave caudad before very short tornal lobe; dorsum orange and very dark brown (nearly black); dorsal forewing with no stigma or brand; veins largely dark brown but bases of  $M_3$ ,  $CuA_1$ , and  $CuA_2$  overscaled with orange; orange entirely filling costal cell and cells  $Sc-R_1$  and  $R_1-R_2$ , proximal 1/2 of  $R_2-R_3$ , and proximal 1/3 of  $R_3-R_4$  and  $R_4-R_5$ ; remainder of apex dark brown narrowing to dark brown margin, this again broadening in  $CuA_2-2A$ , distal edge of orange concave in cells from  $R_5$  to  $2A$ ; proximal 3/4 of orange in discal cell divided by thin brown line; proximal 1/2 of anal cell overscaled with orange; fringe mixture of orange and pale brown cephalad of mid-cell  $CuA_2-2A$ , orange caudad.

Dorsal hindwing also orange and dark brown; costal cell grayish orange; wing overscaled with orange setiform scales from mid-discal cell caudad beyond vein  $2A$ , nearly to termen along vein  $2A$ ; orange occurring in posterior discal cell, central 1/2 of  $Rs-M_1$ , proximal 3/4 of  $M_1-M_3$ , proximal 3/5 of  $M_3-CuA_1$ , and proximal 2/3 of  $CuA_1-CuA_2$  and narrowly along proximal 1/2 of vein  $CuA_2$  in  $CuA_2-2A$ , all with distal edges concave and divided by dark brown veins; fringe orange.

Ventral forewing orange-brown in costal and subcostal cells (latter overscaled with black), distal 2/3 of discal cell, and at apex distad of end of discal cell to vein  $M_3$ , then narrowing to vein  $CuA_2$ ; veins at distal end of discal cell black; orange-brown grading into yellow-orange distad in discal cell, proximad in  $M_2-M_3$  and  $M_3-CuA_1$ , and extending into central 1/2 of  $CuA_1-CuA_2$  and central 1/3 of  $CuA_2-2A$ ; remainder of wing black; fringe dull orange-brown, grading caudad of  $CuA_2$  to yellow-orange at tornus.

Ventral hindwing vaguely mottled olive- to pale orange-brown and yellow-orange, palest beneath postmedial macules, orange-brown most prominent marginally between  $Rs$  and mid-cell  $CuA_2-2A$ , proximad in  $CuA_2-2A$ , and entire anal cell; posterior  $CuA_2-2A$  and anterior  $2A-3A$  black, sparsely overscaled with yellow-orange; small black macule in base of  $M_1-M_3$  near origin of  $M_1$ ; fringe yellow-orange proximad, paler distad, entirely yellow-orange caudad of  $CuA_2$ .

Dorsal head greenish-brown, tan margining eyes; palpi subquadrate with mixture of ochreous and black scales on dorsum, ochreous on sides and venter, 3rd segment black, stout, slightly exceeding scales of 2nd segment; antennae 52% of costal length, entirely black on dorsum, venter black checked with yellow-orange, this enveloping entire segments distad, club long (44% of length of shaft), black on dorsum, yellow-orange on venter, nudum red-brown, last segment brown, 11 (n=2) or 12 (n=6) segments; dorsal thorax greenish-brown centrally, red-brown laterally; ventral thorax black, overscaled with greenish and orange setiform scales, pectus yellow-orange; legs red-brown distad, black proximad with long ochreous setiform scales, protibia smooth, red-brown epiphysis short, extending to juncture of tarsus, mesotibia spined, single pair of spurs, outer about 1/2 length of inner, metatibia spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen black overscaled heavily with yellow-brown setiform scales, caudal end yellow-orange, ventral abdomen cream color.



Genitalia (Fig. 68, 80) - uncus very short, weakly hooked caudad in lateral view, entire and narrow-ing to bluntly pointed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view; tegumen moderately broad in lateral view, moderately broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent ventrad of its middle; anterior arm of saccus moderately long and thin, straight, longer than length of uncus and dorsal portion of tegumen, broad caudad in ventral view, narrowing gradually to blunt point cephalad; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe curved and produced caudad to another small and pointed trian-gular process, sacculus narrow, ventral edge of valva prominently concave cephalad of middle; aedeagus straight, stout, short, about 1.1 times length of valva, caudal end slightly expanded, small and sharply pointed triangular titillator on right side caudad; vesica with cornuti including a small lightly sclerotized and poorly defined flexible but not spinulose area, a heavily sclerotized thorn-like structure, and a heavily sclerotized and sharply pointed spike.

**Female** (Fig. 27-28) - mean forewing length = 15.2 mm (14.7-15.6 mm, n=3, from Costa Rica and Panama); forewing apex pointed, termen convex; hindwing termen convex cephalad, slightly concave caudad before short tornal lobe; dorsum dull black; dorsal forewing with sparse red-orange overscaling in costal cell, yellow-orange overscaling distad in cell Sc-R<sub>1</sub>, towards distal end of discal cell, and in middle 1/2 of anal cell; translucent white subapical macules in R<sub>4</sub>-R<sub>5</sub> and R<sub>5</sub>-M<sub>1</sub>, more or less rectangular, that in R<sub>5</sub>-M<sub>1</sub> largest; translucent white postmedial macules near base of M<sub>3</sub>-CuA<sub>1</sub> (rectangular with distal edge concave) and CuA<sub>1</sub>-CuA<sub>2</sub> (square but distal edge concave, proximal edge beneath origin of CuA<sub>1</sub>, overlap-ping proximal 1/2 of macule in M<sub>3</sub>-CuA<sub>1</sub>); irregular translucent pale yellow postmedial macule in mid-cell CuA<sub>2</sub>-2A, overlapping proximal 1/2 of macule in CuA<sub>1</sub>-CuA<sub>2</sub>; all macules on forewing divided by brown veins; fringe gray, yellowish at tornus.

Dorsal hindwing brownish along costal margin; overscaled with pale orange setiform scales from mid-discal cell caudad beyond vein 2A, nearly to termen along vein 2A; opaque yellow-orange postmedial macules in Rs-M<sub>1</sub>, M<sub>1</sub>-M<sub>3</sub>, and M<sub>3</sub>-CuA<sub>1</sub>, and CuA<sub>1</sub>-CuA<sub>2</sub>, that in Rs-M<sub>1</sub> more or less quadrate with distal edge concave and mixed with blackish scales, that in M<sub>1</sub>-M<sub>3</sub> largest, more or less quadrate, that in M<sub>3</sub>-CuA<sub>1</sub> quadrate, in base of cell, partially overlapped by macule in M<sub>1</sub>-M<sub>3</sub>, that in CuA<sub>1</sub>-CuA<sub>2</sub> quadrate, completely overlapped by macule in M<sub>3</sub>-CuA<sub>1</sub>; macules all divided by brown veins; a few yellow-orange scales at distal end of discal cell; fringe grayish orange.

Ventral forewing dull red-brown in costal cell, distad in Sc-R<sub>1</sub>, in radial cells, at distal end of discal cell, and at apex distad of end of discal cell to vein M<sub>3</sub>, then narrowing to vein CuA<sub>2</sub>; veins at distal end of discal cell black; macules of dorsum repeated; remainder of wing blackish brown; fringe red-brown mixed with black, yellowish caudad of vein CuA<sub>2</sub>.

Ventral hindwing vaguely mottled dull red-brown and tan, palest beneath postmedial macules; poste-rior CuA<sub>2</sub>-2A and anterior 2A-3A black, sparsely overscaled with tan; small black macule in base of M<sub>1</sub>-M<sub>3</sub> near origin of M<sub>1</sub>; fringe red-brown mixed with black cephalad becoming pale red-brown caudad of CuA<sub>2</sub>.

Dorsal head brown with greenish tinge, tan margining eyes; palpi subquadrate, yellow-orange mixed with a few black scales on dorsum, sides and venter, 3rd segment dark brown, stout, slightly exceeding scales of 2nd segment; antennae 48% of costal length, entirely black on dorsum, venter black checked boldly with pale yellow, the yellow broadening distad, club long (48% of length of shaft), black on dorsum, pale yellow on venter, nudum red-brown, distal segment brown, 11 (n=1) or 12 segments (n=2); thorax ;brown, overscaled with red-brown cephalad and gray caudad legs ochreous distad, darker proximad with long ochreous setiform scales, protibia smooth with short red-brown epiphysis extending just beyond junction of tarsus, mesotibia spined, single pair of spurs, outer about 1/2 length on inner, metatibia spined, two pairs of spurs, outer about 3/4 length of inner; dorsal abdomen black, grayish setiform scales cephalad and a few ochreous scales caudad, caudal end ochreous; ventral abdomen brown, gray at seg-ments and a few scattered white scales.

Genitalia (Fig. 91) - lamellae trapezoidal, caudal edge of lamella postvaginalis excavate centrally into relatively broad and shallow V-shape flanked by small lobes, lamella antevaginalis narrower than lamella postvaginalis, ostium bursae about twice as broad as deep; ductus bursae sclerotized, broad, short (1.4 mm including antrum), straight, constricted in middle in ventral view, curved dorsad in lateral view;



corpus bursae broad, about 2 times as long as broad, weakly wrinkled transversely caudad, indistinctly wrinkled longitudinally cephalad.

**Specimens examined.** **COSTA RICA:** Cartago Province; Lankaster Bot. Gardens, ~1370m, 9°50'19"N 83°53'19"W, 12 April 2006, *leg.* I. & M. Nakamura, K. Nishida (1 male; INIC); **COSTA RICA:** Cartago Province; Cerros de la Carpintera, 1500-1650', 14 May 2005, *leg.* I. & M. Nakamura, K. Nishida (1 male, GTA #14055; INIC); **COSTA RICA:** San José Province; El Cañon-Copey Road, 1.4 km N Copey, 30 September 1987, *leg.* G. & A. Austin (1 male; MGCL); **COSTA RICA:** San José Province; Res. Ecol. Oviedo, UCR, San Pedro, 7 June 2005, *leg.* I. Nakamura (1 male; INIC); **COSTA RICA:** San José Province; Res. Ecol. Oviedo, UCR, San Pedro, 18 June 2005, *leg.* I. Nakamura (1 female, GTA #14057; INIC); **COSTA RICA:** San José Province; Res. Ecol. Oviedo, UCR, San Pedro, 19 February 2004, *leg.* I. Nakamura and K. Nishida (2 males; INIC), same locality and collectors, 24 February 2004 (1 male; INIC); **COSTA RICA:** San José Province; San Pedro, U of CR campus forest, 14 March 2003, *leg.* I. Nakamura (1 male; INIC); **COSTA RICA:** San José Province; Cerro Escazu, 1650m, 5 km E Palmichal, 9°50'23"N 84°09'33"W, 23 April 2006, *leg.* I&M Nakamura, M. Posla (1 male; INIC); **PANAMA:** Chiriquí; Vulcan, 1 June 1971, *leg.* H. L. King (2 males, SRS #2693; MGCL); **PANAMA:** Chiriquí; Cerro Punta, 1850m, 7 January 1988, *leg.* McDonald and Schiefer (1 male; ADWC); 26 December 1969, *leg.* T. S. Dickel (2 females; MGCL); **PANAMA:** Chiriquí; Boquete, 26 August 1976, *leg.* T. S. Dickel (2 males; MGCL).

**Distribution and phenology.** Verifiable records of *P. rolla* exist for Costa Rica and Panama (Godman and Salvin 1879-1901, Evans 1955, this study; but see below). The flight season appears concentrated from December through June (11 of 13 records, 14 of 17 specimens).

**Discussion.** *Pamphila rolla* was placed in the catchall genus *Atrytone* Scudder, 1872, by Godman and Salvin (1879-1901) and later in *Poanes* by Hayward (1947) where it was retained by Evans (1955) and most subsequent authors (*e.g.*, Mielke 2005b) despite its removal from that genus by Burns (1992a). The superficial color and pattern of *P. rolla* is indeed reminiscent of such familiar taxa as *Poanes hobomok* (T. Harris, 1862), *Poanes zabulon* (Boisduval and Le Conte, [1837]), and *Poanes taxiles* (W. H. Edwards, 1881), but its male and female genitalia (Fig. 68, 91; see also Godman and Salvin 1879-1901, Evans 1955) are very different (*e.g.*, see figures of *Poanes* in Burns 1992a). Conversely, male genitalia are very similar to those of *Buzyges idothea* in nearly all aspects; the valvae of the two species are virtually identical. Similarly, female genitalia of *P. rolla* have a broad, centrally constricted, and relatively short ductus bursae and a very broad sterigma much like those structures of *B. idothea*. Those genital characters, along with the presence of tibial spines and absence of a stigma, support the new combination of *Buzyges rolla* here proposed.

Draudt (1923) considered *Hesperia zachaeus* Plotz, 1883, its description based on a female putatively from Suriname, as a dark form of *Atrytone melane* (W. H. Edwards, 1869), that species now placed in *Poanes*. Female *B. rolla* are darker than *P. melane* from California, but are of about the same color as those from Mexico and Central America. The maculation of *B. rolla* and *P. melane* are quite different, especially in the pattern on the ventral hindwing where *P. melane* has a very large macule (usually the largest on this wing) in Sc+R<sub>1</sub>-Rs. Evans (1955) placed *H. zachaeus* as a synonym of *Pamphila rolla*. Mielke and Casagrande (2002) showed that *H. zachaeus* had several months' priority over *P. rolla* and thus *P. rolla* fell into its synonymy. No type material, however, of *H. zachaeus* has been encountered (Mielke and Casagrande 2002), and it is unlikely that Draudt's (1923) statement or Evans' (1955) synonymy were based on actual comparisons of specimens. This and the putative type locality for *H. zachaeus* render this synonymy equivocal. Neither *P. rolla* nor *H. zachaeus* have subsequently been reported from Suriname (de Jong 1983a); *P. rolla* is documented only from Panama and Costa Rica (Godman and Salvin 1879-1901, Evans 1955, this study), although its type was attributed to South America (Mabille 1883). Unless a syntype of *H. zachaeus* is located, its identity and status remain unknown and the taxon is not considered here within the synonymy of *P. rolla*, but provisionally treated as a *nomen dubium*. *Pamphila lagon* Mabille, 1891, was determined as synonymous with *P. rolla*, a lectotype male was designated, and its type locality ("Cooktown") was considered a *lapsus* (Mielke and Casagrande 2002).

***Buzyges benito* (Freeman, 1979), new combination**

(Fig. 29-32, 69, 81)

*Poanes benito* Freeman, 1979. Type locality: MEXICO: Jalisco; La Calera, 10 miles south of Cumbre de Autlan; holotype male (Fig. 29-30) at MGCL.

**Description. Male** (Fig. 29-32) - mean forewing length = 14.6 mm (13.9-15.0 mm, n=8; from Mexico); forewing apex pointed, termen slightly convex; hindwing termen convex cephalad, slightly concave caudad before short tornal lobe; dorsum yellow-orange and very dark brown (nearly black); dorsal forewing with no stigma or brand; veins largely dark brown but most of  $M_3$ ,  $CuA_1$ ,  $CuA_2$ , and 2A orange where crossing orange macules; orange filling proximal 3/4 of costal cell and most of proximal 1/2 of cell Sc- $R_1$ ; apex distad of distal end of discal cell dark brown except for quadrate subapical macules in  $R_4$ - $R_5$  (small) and  $R_5$ - $M_1$  (overlapping entirely macule in  $R_4$ - $R_5$  and about twice as large); orange filling discal cell except divided in proximal 2/3 by thin brown line; dark brown margin of even width to vein 2A; proximal 1/2 of anal cell sparsely overscaled with yellow-orange; distal edge of orange concave in each cell  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and  $CuA_2$ -2A; fringe dark brown, tipped with gray.

Dorsal hindwing also orange and dark brown; costal cell grayish orange; wing overscaled with orange setiform scales from mid-discal cell caudad beyond vein 2A, nearly to termen along vein 2A; orange occurring in posterior discal cell at distal end, central 1/2 of  $Rs$ - $M_1$ , proximal 3/4 of  $M_1$ - $M_3$ , proximal 1/2 of  $M_3$ - $CuA_1$ , proximal 1/2 of  $CuA_1$ - $CuA_2$ , and narrowly along proximal 1/2 of vein  $CuA_2$  in  $CuA_2$ -2A, all with distal edges concave and divided by dark brown veins; fringe pale yellow-orange cephalad, deeper yellow-orange caudad of  $CuA_2$ .

Ventral forewing orange in costal and subcostal cells (latter overscaled with black), distal 1/2 of discal cell, and at apex distad of end of discal cell to vein  $M_3$ , then narrowing to vein  $CuA_2$ ; veins at distal end of discal cell black; orange-brown grading into yellow-orange distad in discal cell, proximad in  $M_2$ - $M_3$  and  $M_3$ - $CuA_1$ , and extending into proximal 1/2 of  $CuA_1$ - $CuA_2$  and central 1/3 of  $CuA_2$ -2A; remainder of wing black; fringe gray.

Ventral hindwing vaguely mottled yellow-orange and orange, palest beneath postmedial macules; posterior  $CuA_2$ -2A and anterior 2A-3A black, sparsely overscaled with yellow-orange; small black macule in base of  $M_1$ - $M_3$  near origin of  $M_1$ ; fringe yellow-orange.

Dorsal head greenish, tan margining eyes; palpi subquadrate, entirely yellow-orange, but grading to cream color proximad on venter, 3rd segment black, conical, slightly emergent beyond scaling of 2nd segment; antennae 54% of costal length, entirely black on dorsum, venter black checked with yellow-orange, this enveloping entire segments distad, club 37% of length of shaft, black on dorsum with yellow overscaling proximad, yellow on venter, nudum red-brown, last 2 segments brown, 11 (n=7) or 12 (n=1) segments; dorsal thorax black, overscaled with greenish setiform scales centrally and orange laterally; ventral thorax black, overscaled with ochreous setiform scales, pectus ochreous; legs yellow-orange distad, red-brown proximad with long ochreous setiform scales, protibia smooth, short red-brown epiphysis extending distad to junction of tarsus, mesotibia spined, one pair of spurs, outer 1/2 length of inner, metatibia spined, two pairs of spurs, outer 2/3 length of inner; dorsal abdomen black, lateral surface with orange narrowing caudad, caudal end orange; ventral abdomen cream color grading to orange laterally.

Genitalia (Fig. 69, 81) - uncus short, not hooked caudad in lateral view, entire and narrowing to bluntly pointed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view; tegumen moderately broad in lateral view, moderately broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent slightly ventrad of its middle; anterior arm of saccus moderately long and thin, straight, about length of uncus and dorsal portion of tegumen, broad caudad in ventral view, narrowing gradually to rounded cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small and pointed triangular process near juncture with harpe, harpe curved, narrowing, and produced caudad to another small, pointed triangular process, sacculus narrow, ventral edge of valva concave just cephalad of middle; aedeagus straight, stout, short, about 1.1 times length of valva, caudal end slightly expanded, blunt, triangular titillator on right side caudad; vesica with cornuti including a small lightly sclerotized and poorly defined

flexible but not spinulose area, a heavily sclerotized thorn-like structure, and a heavily sclerotized and sharply pointed spike.

**Female** - unknown.

**Specimens examined.** **MEXICO:** Colima; Barranca de Agua, 25 October 1981, *leg.* S. H. Tobias (1 male, ADW #94-30; MZFC); **MEXICO:** Guerrero; El Faisanal Paraíso, 23 July 1982 (2 males; MAZA); Mpio. Atoyac, Nuevo Delhi, 1350-1450m, 2 October 1988, *leg.* Armando Luis-M. (1 male; MZFC); **MEXICO:** Jalisco; La Calera, 10 miles south of Cumbre de Autlán, July-August 1967, *leg.* P. Hubbell (holotype male; MGCL); **MEXICO:** Oaxaca; La Soledad-Buena Vista, 5000', 6 May 1990, *leg.* J. Kemner (1 male; MGCL); **MEXICO:** Oaxaca; Sierra Madre del Sur, La Soledad-Buena Vista, 5000', 16 April 1990, *leg.* J. Kemner (1 male, SRS #4468; MGCL); **MEXICO:** Oaxaca; Mpio. Candelaria Loxicha, La Soledad-Buenavista, 1470-1530 m, 15°58'32"N 96°31'54"W, 18 March 2007, *leg.* MZFC collectors (1 male; MZFC), same locality, 1 May 2008, *leg.* MZFC collectors (2 males; MZFC), same locality, 23 May 2008, *leg.* MZFC collectors (2 males; MZFC), same locality, 28 May 2003, *leg.* MZFC collectors (1 male; MZFC), same locality, 24 June 2008, *leg.* A. D. Warren (1 male; ADWC), same locality and date, *leg.* MZFC collectors (3 males; MZFC), same locality, 21 September 2007, *leg.* MZFC collectors (6 males; MZFC); same locality, 24 October 2008, *leg.* A. D. Warren (3 males; ADWC); same locality and date, *leg.* MZFC collectors (14 males; MZFC); same locality, 30 November 2008, *leg.* MZFC collectors (2 males; MZFC); **MEXICO:** Oaxaca; Mpio. Pluma Hidalgo, 3 rd. Km W Pluma Hidalgo on road to Hwy. 175, 22 June 2008, *leg.* A. D. Warren (1 male; ADWC); La Pasionaria, 1500-1650 m, 15°56'09"N 96°25'08"W, 23 October 2008, *leg.* MZFC collectors (1 male; MZFC); **MEXICO:** Oaxaca; Ixtlan de Juárez, 7500', 4 July 1991, *leg.* J. Kemner (1 male; ADWC).

**Distribution and phenology.** We have examined specimens of *B. benito* only from the western Mexican states of Jalisco, Colima, Guerrero, and Oaxaca, from cloud forest habitats in the Sierra Madre del Sur. De la Maza and de la Maza (1993) also reported the species from Chiapas, but we have not seen material from that state. In Oaxaca (Sierra Madre del Sur), *B. benito* flies most months of the year. Overall, records are concentrated from May to July and from September to November.

**Biological notes.** *Buzyges benito* is typically encountered as solitary males guarding perches (from 1.5 to 3 m above the ground) along roadsides, from 9:45 to 14:30 h, during sunny periods. Perching males are quite wary, and chase all other hesperiids from perching sites. Several grasses, including scattered *Chusquea* (Poaceae), occur at habitats in Oaxaca, but the foodplants utilized by *B. benito* in these areas remain unknown. Despite repeated visits by the junior author and researchers from the MZFC to a known population of *B. benito* between La Soledad and Buenavista in the Sierra Madre del Sur of Oaxaca, a site where males can almost always be encountered under favorable weather conditions, the female of the species remains unknown.

**Discussion.** *Poanes benito*, described from and apparently endemic to Mexico, was compared only with *Poanes zabulon* in its original description (Freeman 1979). The species is actually more similar in pattern and genitalia to *B. rolla*. The dorsum of *B. benito* has narrower black margins than *B. rolla*, the orange area of the forewing is not crossed by darkened veins, and there is less black in the apical region of the forewing so that the orange of the discal area is continuous with the subapical macules. The venters of the two species are virtually identical. The genitalia of *B. benito*, while resembling those of *B. rolla*, differ in detail (compare Fig. 68 and 69). The species has been included within *Poanes* since its description (e.g., Mielke 2005b) despite Burns' (1992a) contention that it belonged elsewhere. As noted for *Buzyges rolla* above, the genitalia of male *P. benito* (illustrated previously by Freeman 1979) indicate its placement in *Buzyges* and *Buzyges benito* is here proposed as a new combination.

***Buzyges mellanaformis* Austin and A. Warren, new species**

(Fig. 33-36, 70, 82, 92)

**Description. Male** (Fig. 33-34) - mean forewing length = 14.2 mm (13.8-14.8 mm, n=8; from Costa Rica); forewing with pointed apex, termen prominently convex, no stigma or brand; hindwing convex,

weakly lobate at tornus; dorsal forewing dark brown with red-brown iridescence especially distad; proximal 1/2 costa yellow-orange; sparse paler yellow-orange overscaling in base of discal cell and  $CuA_2-2A$ ; yellow-orange overscaling of flat and setiform scales in middle 1/2 of anal cell; opaque pale yellow-orange macules as follows: subapical in mid- $R_3-R_4$  (a few scales) and near bases of  $R_4-R_5$  and  $R_5-M_1$ , more or less quadrate, of about equal size, series more or less perpendicular to costa; postmedial,  $M_2-M_3$ , centered beneath origin of  $M_2$ , more or less quadrate;  $M_3-CuA_1$ , in base of cell, triangular with concave distal edge;  $CuA_1-CuA_2$ , quadrate with distal edge concave, largest, centered under origin of  $CuA_1$ , overlapping proximal 1/2 of macule in  $M_3-CuA_1$  and completely macule in  $CuA_2-2A$  that is well-developed, more or less quadrate but with caudal portion extending far proximad; no macule in discal cell; fringe dull pale orange-brown.

Dorsal hindwing dark brown with iridescence as on forewing; proximal 2/3 overscaled with long ochreous and orange setiform scales in discal cell and caudad, extending nearly to termen along vein 2A; prominent opaque pale yellow-orange postmedial macules in  $M_1-M_3$  (quadrate),  $M_3-CuA_1$  (triangular), and  $CuA_1-CuA_2$  (quadrate), these separated by brown veins, that in  $M_1-M_3$  divided by thin line of brown; vaguely defined pale yellow-orange macule at distal end of discal cell; fringe pale orange.

Ventral forewing dull dark brown; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with red-brown, entirely filling costal, radial, and medial, and most of subcostal cells, distad of macules in  $M_2-M_3$  and  $M_3-CuA_1$ , narrowing to vein  $CuA_2$ ; anterior discal cell overscaled with red-brown, flat and setiform scales; posterior 1/2 of  $CuA_2-2A$  (proximad of pale macule) and all of anal cell with brown paler than remainder of wing; macules as on dorsum except subapical macules vague (mixed with red-brown overscaling) and macule in  $CuA_2-2A$  without proximal extension cephalad and paler yellow-orange; veins at distal end of discal cell black; fringe as on dorsum.

Ventral hindwing entirely overscaled with red-brown except sparser on both sides of vein 2A making this region largely black, and as vaguely paler postmedial macules, appears mottled; small red-brown (slightly darker than ground color) macule in base of  $M_1-M_3$  near origin of  $M_1$ , may be vague, another darker macule may be near origin of  $M_3$  and/or dark scaling extends along veins at end of discal cell; fringe as on dorsum.

Dorsal head black with mixture of black, greenish, and ochreous setiform scales, small ochreous spots just behind antennae, ochreous behind and beneath eye; palpi subquadrate, dorsum with mixture of black and ochreous setiform scales, whitish on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae long (55% of costal length), shaft black on dorsum, checkered narrowly with yellow-orange on venter, club 34% of length of shaft, black on dorsum, yellow-orange on venter, nudum red-brown becoming darker at tip, 11 (n=2), 12 (n=3), or 13 (n=3) segments; dorsal thorax black and ochreous with green iridescence especially centrally; ventral thorax ochreous; legs red-brown with long ochreous setiform scales especially proximad, protibia not spined, red-brown epiphysis short, extending distad to barely overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 2/3 length of inner, metatibia not spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen black, long ochreous setiform scales cephalad, caudal end pale orange; ventral abdomen ochreous.

Genitalia (Fig. 70, 82) - uncus very short, weakly hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, well-separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view; tegumen broad in lateral view, broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent ventrad of its middle; anterior arm of saccus moderately long and thin, straight, about length of uncus and dorsal portion of tegumen, moderately broad caudad in ventral view, then narrower (but not tapering) to rounded cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to small pointed triangular process near juncture with harpe, harpe curved and produced caudad to sharply pointed process, sacculus narrow, ventral edge of valva prominently concave in middle; aedeagus slightly curved cephalad, tubular, long, about 1.5 times length of valva, caudal end slightly expanded, blunt, small triangular titillator on right side caudad; vesica with cornuti including a small flexible lightly spinulose pad and two small heavily sclerotized thorn-like structures.

**Female** (Fig. 35-36) - mean forewing length = 15.2 mm (14.9-15.7 mm, n=3, from Costa Rica); forewing with pointed apex, termen prominently convex; hindwing convex, very weakly lobate at tornus; dorsal



forewing dull brown, little iridescence; proximal 1/2 costa dark red-brown; sparse dark red-brown overscaling at base of discal cell and  $CuA_2$ -2A; sparse orange overscaling of flat and setiform scales in middle 1/2 of anal cell; opaque pale yellowish macules as follows: subapical in base of  $R_5$ - $M_1$ , irregular in shape; postmedial,  $M_2$ - $M_3$ , in base of cell, quadrate;  $M_3$ - $CuA_1$ , in base of cell, triangular, completely overlapped by macule in  $M_2$ - $M_3$ ;  $CuA_1$ - $CuA_2$ , proximal edge just proximad of origin of  $CuA_1$ , quadrate (nearly square), largest, overlapping proximal edge of macule in  $M_3$ - $CuA_1$ , completely overlapping macule in  $CuA_2$ -2A that is narrow cephalad and broader caudad; no macule in discal cell; fringe mixture of orange and brown becoming pale orange caudad of vein  $CuA_2$ .

Dorsal hindwing dull brown without iridescence seen on male; proximal 2/3 overscaled with long ochreous and brown setiform scales in discal cell and caudad, nearly extending to termen along vein 2A; opaque yellow-orange postmedial macules in  $M_1$ - $M_3$  (narrow cephalad, broader caudad and divided by thin brown line),  $M_3$ - $CuA_1$  (quadrate), and  $CuA_1$ - $CuA_2$  (vague), these more or less quadrate, separated by brown veins; vaguely defined pale yellow-orange macule occasionally at distal end of discal cell; fringe pale orange.

Ventral forewing dull dark brown; costa, apex, and outer margin cephalad of vein  $CuA_1$  overscaled with red-brown, entirely filling costal, radial, and medial, and most of subcostal cells, this occurring distad of macules in  $M_2$ - $M_3$  and  $M_3$ - $CuA_1$ , narrowing to vein  $CuA_2$ ; anterior discal cell overscaled with red-brown, flat and setiform scales; posterior 1/2 of  $CuA_2$ -2A (proximad of pale macule) and all of anal cell with brown paler than remainder of wing; macules as on dorsum except subapical macules vague (mixed with red-brown overscaling) and macule in  $CuA_2$ -2A without proximal extension cephalad and paler yellow-orange; veins at distal end of discal cell black; fringe brown cephalad to  $CuA_2$ , then pale orange.

Ventral hindwing entirely overscaled with red-brown except sparser on both sides of vein 2A, and as vaguely paler postmedial macules; small red-brown (slightly darker than ground color) macule in base of  $M_1$ - $M_3$  near origin of  $M_1$ , may be vague, another darker macule may be near origin of  $M_3$  and/or dark scaling extends along veins at end of discal cell; fringe orange, paler caudad of  $CuA_2$ .

Dorsal head black with mixture of black, greenish, and ochreous setiform scales, small ochreous spots just behind antennae, ochreous behind and beneath eye; dorsal palpi mixture of black and ochreous setiform scales, whitish on sides and venter, black on inner surface, 3rd segment black, barely extending beyond scales of 2nd segment; antennae 50% of costal length, shaft black on dorsum, checkered narrowly with yellow-orange on venter, club long (43% of length of shaft), black on dorsum, yellow-orange on venter, nudum red-brown becoming darker at tip, 12 (n=2) or 13 segments (n=1); dorsal thorax black and ochreous with green iridescence especially centrally; ventral thorax ochreous; legs ochreous with long ochreous setiform scales especially proximad, protibia not spined, red-brown epiphysis short, extending distad to barely overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen black, long ochreous setiform scales cephalad, caudal end pale orange; ventral abdomen ochreous.

Genitalia (Fig. 92) - lamellae trapezoidal, caudal edge of lamella postvaginalis excavate centrally into relatively broad and shallow V-shape flanked by small lobes, lamella antevaginalis narrower than lamella postvaginalis, excavate centrally, ostium bursae about twice as broad as deep; ductus bursae sclerotized, relatively long (2.2 mm including antrum), straight in ventral view and constricted in middle, slightly curved dorsad in lateral view; corpus bursae elongate, about 1.4 times as long as broad, prominently wrinkled transversely caudad, indistinctly wrinkled longitudinally cephalad.

**Types.** Holotype male with the following labels: white, printed - / **COSTA RICA:** Prov. San José / Bajo la Hondura, 1150-1450m / 10°03'37"N, 83°58'55"W / 13. vi. 2005 / I. Nakamura leg. /, red, printed - / HOLOTYPE / *Buzyges mellanaformis* / Austin & A. Warren /, deposited at MGCL. Paratypes: **COSTA RICA:** Cartago Province; Alto Belén, 1500-1700m, above Muñeco, Orosi Valley, 9°45'56"N, 83°54'04"W, 2 September 2008, leg. I. Nakamura (5 males; INIC); same locality and collector, 26 September 2007, (5 males, GTA #14031; INIC); **COSTA RICA:** Cartago Province; Parque Nat. Tapanti, ~1400m, 9°44'01"N, 83°46'46"W, 3 June 2005, leg. I. & N. Nakamura, K. Nishida & A. Damaceno (1 female, GTA #14058; INIC); **COSTA RICA:** San José Province; Bajo la Hondura, 1150-1450m, 10°03'37"N 83°58'55"W, 13 June 2005, leg. I. Nakamura (1 male; INIC); same locality and collector, 3 September 2007 (2 males; INIC); same locality and collector, 23 September 2006, (1 female; INIC); same locality, 21 March 2006,

leg. I. & M. Nakamura (1 male; INIC); **COSTA RICA:** Puntarenas Province; Monteverde Preserve, 1500m, 10.18°N, 84.48°W, 3 December 1994, W. A. Haber (1 female, ADW #99-30; ADWC); same location, 24 June 1996, WAH-154, reared, host: *Chusquea scabra* (1 female; WAHC); Monteverde, Windy Corner, 10.18°N, 84.48°W, 1500m, 31 December 1996, W. A. Haber (1 male; WAHC). Paratypes are deposited in ADWC, INIC, and WAHC.

**Type locality.** COSTA RICA: San José Province; Bajo la Hondura, 1150-1450 m, 10°03'37"N 83°58'55"W.

**Etymology.** The name of this species reflects its superficial resemblance to a number of species of the genus *Quasimellana* Burns, 1994, formerly placed within *Mellana* Hayward, 1948 (see Burns 1994b).

**Distribution and phenology.** The species is presently known from elevations above 1150 m in the Cordillera Central of Cartago and San José provinces and Cordillera de Tilarán in Puntarenas Province, Costa Rica. Most specimens were taken in September, but individuals from March, June, and December suggest more than one generation annually.

**Biological notes.** This species was reared by William Haber, at Monteverde, Costa Rica, on *Chusquea scabra* Soderstr. and C. Calderón (Poaceae).

**Diagnosis and discussion.** *Buzyges mellanaformis* superficially shares with both *Onespa* and other *Buzyges* the lack of a stigma, relatively long antennae, subquadrate palpi with a relatively short 3rd segment, and marked sexual dimorphism. The species' alliance with *Buzyges* is indicated by genital morphology of both sexes. Males have a relatively short uncus and tegumen and saccus typical of *Buzyges* and the valva is compact with a short triangular caudal process. Female genitalia are also typical of *Buzyges* in the very broad sterigma, broad and centrally constricted ductus bursae without the complex sclerotization seen for *Onespa*, and a broad corpus bursae. The meso- and metatibia of *B. mellanaformis*, however, are not spined, different from others of the genus. As with *Onespa* (see above), the presence of tibial spines is not considered a genus-specific character in *Buzyges*.

*Buzyges mellanaformis* among *Buzyges* species has the most convex termen to the forewing. It lacks orange in the discal cell of the forewing, its macules forming an evenly curved postmedial series extending to the subapical macules, with a break in cell  $M_1-M_2$ . Overall the species has a more subdued and duller aspect than others of the genus.

### Discussion and diagnosis of *Buzyges*

*Buzyges* was described as being similar to the then prevailing concept of *Atrytone* Scudder, 1872 (Godman 1900 in Godman and Salvin 1879-1901), species now included in myriad genera (Mielke 2005a, 2005b). It was distinguished from those species by "having a much longer club to the antennae, the club, moreover, being densely clothed with scales to near the tip" (Godman 1900 in Godman and Salvin 1879-1901). Godman (1900 in Godman and Salvin 1879-1901) also noted that male genitalia of *Buzyges* were "not unlike those of *Atrytone myron* and *A. rolla*", those species now included within *Quasimellana* and *Buzyges*, respectively (Burns 1994b, this study). Evans' (1955) characterization of the genus stated "antenna = 1/2 costa" with the "club long = 1/2 rest of shaft" with a nudum of 12 segments, the mesotibiae having spines, the palpi with a hairy second segment concealing a short 3rd segment, and an absence of a stigma. Aside from those comparisons, no further discussion of affinities of *Buzyges* with other taxa has been advanced. Evans (1955) described *B. idothea* as "Abnormal: position uncertain". Mabilie (1883) noted the resemblance of *B. rolla* to *Poanes zabulon*. Freeman (1979) compared *B. benito* only with *P. zabulon*. The similarity of male genitalia of *B. idothea* and *B. rolla* are more profound than indicated by Godman (1900 in Godman and Salvin 1879-1901) and all subsequent authors. Even the similarities between *B. rolla* and *B. benito* have been ignored except for the vaguely suggestive action by Burns (1992a) to recognize their misplacement and his simultaneous removal of both from *Poanes*. Previous illustrations of male genitalia of *B. idothea* (Godman and Salvin 1879-1901, Evans 1955), *B. rolla* (Godman and Salvin 1879-1901, Evans 1955), and *B. benito* (Freeman 1979), however, are generally insufficient to compare and relate those species except for the resemblance of their valvae.

Although Burns (1992a) did not offer an alternative placement, in actuality these species appear allied with *Buzyges* at the generic level. Recent studies have circumscribed a number of genera composed of members with disparate superficial phenotypes, yet united by genital morphology (Burns 1990, 1992a, 1992b, 1994a, 1994b, 1996; this paper). Thus, *Buzyges* represents another genus displaying a wide range of wing pattern variation, especially among males. One species, *B. idothea*, with its boldly orange-spotted dark wings, resembles certain species of *Dalla* Mabille, 1904, as noted by Evans (1955). One species somewhat resembles some taxa included within *Quasimellana* Burns, 1994. The wings of the two remaining species closely approximate some species of *Poanes*, hence their previous placement there (Mielke 2005b, but see Burns 1992a).

*Buzyges*, as now constituted, are dark insects variably marked with orange. All have subapical macules that may be enveloped within the orange of the postmedial region (*B. rolla*) or disjunct. The black of *Buzyges idothea* is expanded on the forewing at the expense of orange giving it a somewhat different aspect than its three congeners. All have an orangish costa based on the forewing, black in the base of the discal cell, and yellowish in the basal 1/2 of the anal cell. The dorsal hindwing has a broad orange area and orange fringes that are especially prominent on the tornal lobe (less so at the tornus of the forewing). The ventral forewing of *Buzyges* is somewhat like that of *Onespa* with yellow-orange along the costa and apically and extended broadly to  $CuA_1$  before narrowing to the termen. The genera differ in the absence on *Onespa* of black on the veins at the distal end of the discal cell. The ventral hindwing of *Buzyges* is overscaled somewhat similarly to *Onespa*, but has a mottled aspect without the pale macule in the discal cell. Instead, *Buzyges* has a small dark, often blackish, macule at the base of  $M_1$ - $M_3$  near the origin of  $M_1$ . While both genera have a blackened area on either side of vein 2A, on *Buzyges* the ground color surrounding that area is distinctly contrasting with the remainder of the ventral hindwing (yellow). On *Onespa* the anal margin is of the same color as the wing cephalad, although *O. gala* and *O. brockorum* have a thin line of a pale color anterior to the darkened area in mid- $CuA_2$ -2A. *Buzyges* exhibits sexual dimorphism with females having more constrained pale areas, these areas paler than on the male and may be whitish (subapical macules of *B. idothea*, subapical and some submarginal macules on *B. rolla*). *Buzyges* had been partly distinguished by the unique antennae of *B. idothea*, but these seem to represent an apomorphic condition masking the otherwise great similarity of *B. idothea* to other species here included in *Buzyges*.

*Buzyges* is here, as was *Onespa* above, largely defined by genital traits, especially cornuti composed of two heavily sclerotized structures, one often spike-like and the other thorn-like, and at least a hint of another sclerotized area reaching its greatest development in *B. mellanaformis*. Other genital characters of males that serve to unite the species of the genus include the simple valva with two more or less triangular processes caudad; a robust aedeagus lacking complex titillators, but with a simple triangular process on its right side; an undivided uncus; a flaring tegumen cephalad; and a saccus of medium length. Female genitalia (not previously described or illustrated) have a broad sterigma with a very broad ostium bursae; a broad, relatively short, and largely sclerotized ductus bursae that is somewhat constricted in its middle and curves dorsad; and a corpus bursae that is wrinkled transversely caudad and longitudinally cephalad. Many of these characters are shared with taxa currently placed within *Librita* (Mielke 2005a). Those are treated below.

*Onespa* and *Buzyges* are distinguished by several characters. *Onespa* have proportionally longer wings while those of *Buzyges* are shorter and more compact. The nudum of *Onespa* has on average more segments (12.6) than *Buzyges* (11.7). Male genitalia of *Onespa* have a relatively long flexible cornutus; this is shorter and less well-developed on *Buzyges*. Additionally *Onespa* has one or two spike-like cornuti while one cornutus of *Buzyges* has a broad base and appears more thorn-like. The saccus of *Onespa* tends to be longer than that of *Buzyges* and the latter's valva is proportionally broader and more compact. Female genitalia of *Onespa* have a relatively narrower sterigma than *Buzyges* and a more deeply divided caudal edge. The ostium bursae is less broad on *Onespa* than on *Buzyges*. The ductus bursae of *Onespa* is very long, relatively narrow, straight in both ventral and lateral views, and complexly sclerotized with a lateral pouch cephalad. That of *Buzyges* is shorter and broader, somewhat constricted in its middle and without the complex sclerotization and pouch seen on *Onespa*. The corpus bursae of *Onespa* tends to be more elongate than the more bulbous corpus bursae of *Buzyges*.

Our current lack of records for *Buzyges* between southern Mexico and Costa Rica may or may not reflect reality. We suspect *Buzyges* will eventually be found in that region, as careful fieldwork is conducted at higher elevations in humid forest habitats.

**Key to male *Buzyges***

1. Dorsal forewing with continuous series of postmedial orange macules ..... ***B. mellanaformis*, new species**
- Dorsal forewing with orange not in series of submarginal macules ..... **2**
- 2(1). Dorsal forewing with distinct macules, largest in medial area; antennal club yellow (with metallic green iridescence in sunlight) ..... ***B. idothea* Godman**
- Dorsal forewing without distinct macules, orange extending broadly proximad, antennal club largely brown ..... **3**
- 3(2). Orange in submarginal area of dorsal forewing more or less continuous with orange subapical macules, caudal end of harpe broad ..... ***B. rolla* (Mabille)**
- Orange in submargin of dorsal forewing not continuous with orange subapical macules, caudal end of harpe narrow ..... ***B. benito* (Freeman)**

**Key to female *Buzyges* (female of *B. benito* unknown)**

1. Forewing with prominent orange macule in discal cell ..... ***B. idothea* Godman**
- Forewing without macule in discal cell ..... **2**
- 2(1). Submarginal macules largely white, hindwing with submarginal macules broad ..... ***B. rolla* (Mabille)**
- Submarginal macules of forewing pale yellow-orange, hindwing with small submarginal macules ..... ***B. mellanaformis*, new species**

***Librita* Evans, 1955**

Type species: *Hesperia librita* Plötz, 1886, by original designation.

*Librita* is another genus that possesses traits suggesting potential affinity with *Onespa* and *Buzyges* as noted above. The genus was erected by Evans (1955) to embrace three species of hesperiines from the northern neotropics that he characterized by a relatively short antennal club and a “broad, conspicuous stigma”, among other traits. One species, *Librita raspa* Evans, 1955, has subsequently been transferred to *Paratrytone* as the senior synonym of *Paratrytone miahua* Steinhauser, 1996 (Mielke and Casagrande 2002). The remaining two species attributed to *Librita* (Mielke 2005a) have not been critically examined, except by Godman and Salvin (1879-1901) and Evans (1955).

**Description.** Palpi quadrate, shaggy, 3rd segment robust, nearly erect, barely exceeding scales of second segment. Antennae about 1/2 costa (53% on males, 50% on females); club stout, about 1/3 shaft (35% on males, 34% on females), bent to constricted apiculus beyond thickest part; nudum varies from 12 to 13 segments, subequally divided between club and apiculus (5-6 segments on club); shaft black above, yellow-orange and checked narrowly with black (broadest distad) on venter; nudum red-brown.

Wings weakly produced; forewing apex 1.3 times length along vein 2A; hindwing shorter at vein Sc+R<sub>1</sub> than at 2A and CuA<sub>1</sub>; 3A about length of Sc+R<sub>1</sub>. Male with conspicuous, broad, and continuous stigma in CuA<sub>1</sub>-CuA<sub>2</sub> and CuA<sub>2</sub>-2A with androconial scales extending across vein CuA<sub>2</sub> (Fig. 61). Hindwing origin Rs nearer to cell end than base. Forewing origin CuA<sub>2</sub> nearer to origin of CuA<sub>1</sub> than to base of wing. Sexual dimorphism minor. Wings broadly orange marked with black.

Meso- and metatibiae not spined, long fringes of setiform scales on meso- and metafemur and on metatibia, mesotibiae with one pair spurs, outer about 2/3 length of inner, metatibiae with two pairs, outer about 1/2 length of inner.

Male genitalia with gnathos bifid, arms slender and connivent, uncus narrow, bluntly bilobed at end, narrower than gnathos in dorsal view, about length of gnathos; separation of gnathos and uncus in lateral view moderately deep. Tegumen flaring cephalad, ventral arm with dorsal arm of saccus combining into



a structure curved below its middle, anterior arm of saccus moderately long, narrowing to a bluntly pointed cephalic end in ventral view. Valvae simple and unarticulated, with costa/ampulla relatively straight and undifferentiated between themselves and harpe, ampulla with small dorsal triangular process caudad, harpe with dorso-caudal triangular process. Aedeagus relatively narrow and short (1.1 times length of valva), triangular processes (titillators) on right side and venter near caudal end, with cornuti consisting of two heavily sclerotized structures.

Female genitalia characterized by a short (1.6 mm), sclerotized, and slightly constricted centrally ductus bursae, straight, and shorter than corpus bursae. Lamella antevaginalis about as broad as lamella postvaginalis and excavated caudad; lamella postvaginalis also very broad with shallow caudal indentation; ostium bursae broad and shallow, twice as broad as deep. Corpus bursae weakly wrinkled longitudinally, no signa.

**Distribution and richness.** *Librita*, as here revised including only *Librita librita*, occurs from northwestern Mexico, through central and southern Mexico to Guatemala, and putatively Panama (Plötz 1886, Godman and Salvin 1879-1901, Evans 1955, this study).

Discussion of the genus is included below under its single known species.

***Librita librita* (Plötz, 1886)**

(Fig. 37-44, 61, 71, 83, 93)

*Hesperia librita* Plötz, 1886. Type locality: PANAMA; location of type unknown.

*Augiades hecale* Godman, 1900 (synonymy established by Godman 1907). Type locality: MEXICO: Guerrero; Omilteme and Xucumanatlan; holotype male (Fig. 37-38) in Godman and Salvin collection at BMNH.

**Description. Male** (Fig. 37-40, 61) - mean forewing length = 14.8 mm (13.3-15.4 mm, n=12; from various locations in Mexico); forewing weakly produced with pointed apex, termen slightly convex, conspicuous, broad, gray-brown stigma, triangular in  $CuA_1$ - $CuA_2$  along posterior edge of discal cell from distad of origin of  $CuA_1$  to base of cell, continuous across basal 1/3 of vein  $CuA_2$ , narrowing by about 1/2 its width at vein 2A, cephalic edge of anterior portion margined with long and thin black scales on vein of discal cell; hindwing convex, weakly lobate at tornus; dorsal forewing yellow-orange marked with black; black as moderately broad outer margin, broadest apically and especially at tornus where occupying distal 1/3 of anal cell; black also variably associated with stigma (mostly proximad), a more or less rectangular patch distad of discal cell (between veins  $M_1$  and  $M_3$ ), but not quite reaching marginal black, bases of cell  $CuA_2$ -2A and discal and anal cells with sparse dusting of black scales; bases of  $R_3$ - $R_4$ ,  $R_4$ - $R_5$  and  $R_5$ - $M_1$  black, which, along with marginal black, weakly defines subapical macules in same cells; veins  $R_3$  to 2A prominently black distad and caudad of discal cell; fringe yellow-orange.

Dorsal hindwing also largely yellow-orange marked with black; outer margin more narrowly black than on forewing, this broadest towards tornus except partially interrupted by wedge of yellow-orange at vein 2A, not quite reaching termen; costal margin black cephalad of  $R_s$  and extending caudad into base of  $R_s$ - $M_1$ ; distal end of discal cell, veins  $M_1$ ,  $M_3$ ,  $CuA_1$ , and  $CuA_2$  black; long yellow-orange setiform scales in base of discal cell, proximal 1/2 of  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A, and extending nearly to termen in 2A-3A; fringe pale brown cephalad, yellow-orange caudad of  $CuA_2$ .

Ventral surface largely orange; forewing more yellow-orange as three subapical macules and submarginally between  $M_3$  and 2A; discal cell with orange gradually shading to or mottled with yellow-orange distad; base of discal cell black, extending furthest distad along cephalic and caudal edges; cells  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A black proximad and distad of the broad yellow-orange macules, entire anal cell black; veins  $M_3$ ,  $CuA_1$ , and  $CuA_2$  and those at end of discal cell black; fringe mostly orange, yellow at tornus.

Ventral hindwing appears mottled with weakly contrasting narrow yellow-orange postmedial macules between  $Sc+R_1$  and mid-cell  $CuA_2$ -2A and at distal end of discal cell, those in  $Sc+R_1$ - $R_s$  and  $R_s$ - $M_1$  offset proximad from remaining macules, macule in  $M_1$ - $M_3$  often doubled; terminal line vaguely black, slightly expanded at ends of veins; black overscaling in bases of cell 2A-3A and anal cell; yellow-orange setiform scales along vein 3A extending to termen; fringe mostly orange, yellow at tornus.

Dorsal head yellow-orange, pale yellow-orange above and becoming yellow behind and beneath eyes; dorsal palpi with orange setiform scales becoming paler and mixed with a few black scales on sides and



**Figure 37-60.** *Librita* and *Neposa* (full data in text; ds = dorsal surface, vs = ventral surface; scale bar = 10mm). **37)** *L. librita*, male (holotype of *Augiades hecale*), Guerrero, Mexico, ds; **38)** same, vs; **39)** *L. librita*, male, Michoacán, Mexico, 27 July 1996, ds; **40)** same, vs; **41)** *L. librita*, female, Chiapas, Mexico, 19-23 October 1971, ds; **42)** same, vs; **43)** *L. librita*, female, Michoacán, Mexico, 23 July 1997, ds; **44)** same, vs; **45)** *N. heras*, holotype male, Guerrero, Mexico, ds; **46)** same, vs; **47)** *N. heras*, male, Oaxaca, Mexico, 19 October 2008, ds; **48)** same, vs; **49)** *N. heras*, female, Guerrero, Mexico, ds; **50)** same, vs; **51)** *N. hestia*, holotype female, Veracruz, Mexico, 8 April 1990, ds; **52)** same, vs; **53)** *N. isabelae*, holotype male, Guatemala, 22 October 1965, ds; **54)** same, vs; **55)** *N. isabelae*, paratype male, Guatemala, 4 December 1965, ds; **56)** same, vs; **57)** *N. armandoi*, holotype male, Oaxaca, Mexico, 23 September 2007, ds; **58)** same, vs; **59)** *N. armandoi*, paratype male, Oaxaca, Mexico, 25 October 2008, ds; **60)** same, vs.

venter, 3rd segment black with numerous cream-colored scales, extending slightly beyond scales of 2nd segment; antennal shaft black above, yellow-orange and checked narrowly with black (broadest distad) on venter, nudum pale red-brown, dark red-brown on distal segment, 12 (n=6) or 13 (n=4) segments; dorsal thorax orange; ventral thorax ochreous; legs brown proximad, orange distad with long yellow-orange setiform scales especially proximad, protibia not spined, pale yellow-orange epiphysis rather short, ex-

tending distad to slightly overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 2/3 length of inner, metatibia not spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black, heavily overscaled with orange setiform scales, these long cephalad, caudal end yellow-orange; ventral abdomen ochreous.

Genitalia (Fig. 71, 83) - uncus short, hooked caudad in lateral view, entire and narrowing to weakly bilobed caudal end in dorsal view; gnathos

robust, moderately separated from and of same length as uncus in lateral view, divided with arms very slender, widely apart cephalad and approaching caudad in ventral view, broader than uncus in middle; tegumen thin in lateral view, broad in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure curved just ventrad of its middle; anterior arm of saccus relatively short and thin, mostly straight to slightly upcurved cephalad, barely longer than length of uncus and dorsal portion of tegumen, moderately broad in ventral view and tapering gradually to bluntly rounded cephalic end; valva simple and somewhat elongate, no differentiation between costa and ampulla, latter produced dorsally to pointed triangular process near juncture with harpe, harpe curved rather abruptly with weakly serrate caudal end before another pointed triangular process oriented dorso-caudad, sacculus narrow, ventral edge of valva concave in middle; aedeagus slightly curved upward cephalad, expanded caudad where somewhat flattened dorsally, short, about 1.1 times length of valva, caudal end curved, slightly expanded, triangular titillator on right side just cephalad of caudal end and another of similar size yet more cephalad on venter; vesica with two heavily sclerotized, thin, and sharply pointed spike-like cornuti.

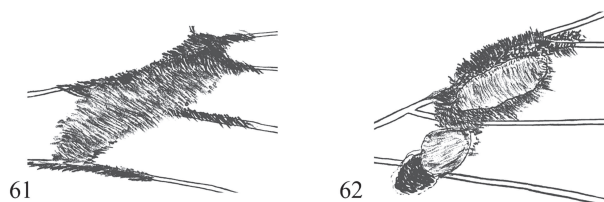
**Female** (Fig. 41-44) - mean forewing length = 15.7 mm (15.1-16.3 mm, n=5; from various locations in Mexico); forewing apex less pointed than on male, termen convex (more so than on male); hindwing convex (more so than on male), weakly lobate at tornus; color and pattern similar to male; no stigma; yellow-orange on forewing paler; markings less crisply defined largely due to black overscaling encroaching into orange areas; position of male's stigma, base of discal cell, and entire costa overscaled with black; dorsal hindwing with more black overscaling basad; fringe of forewing pale brown cephalad, dull yellow-orange caudad of vein 2A, fringe of hindwing dull yellow-orange, mixed with brown cephalad.

Ventral surface very similar to male; setiform scales along 3A sparse and confined to basal 1/3; fringes as on dorsum.

Dorsal head yellow-orange, whitish above and becoming yellow behind and beneath eyes; dorsal palpi with orange setiform scales becoming paler and mixed with a few black scales on sides and venter, 3rd segment black with numerous cream-colored scales, extending slightly beyond scales of 2nd segment; antennal shaft black above, yellow-orange and checked broadly with black on venter, nudum pale red-brown, dark red-brown on distal segment, 13 (n=1) segments; dorsal thorax pale olive-orange; ventral thorax whitish; legs brown proximad, pale yellow-orange distad with long yellow-orange setiform scales especially proximad, protibia not spined, pale yellow-orange epiphysis rather short, extending distad to slightly overlap proximal portion of tarsus, mesotibia not spined, pair of spurs distad, outer about 1/2 length of inner, metatibia not spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen dark brown, overscaled with olive-orange (cephalad) and orange (caudad) setiform scales, these long cephalad, caudal end yellow mixed with black; ventral abdomen yellow.

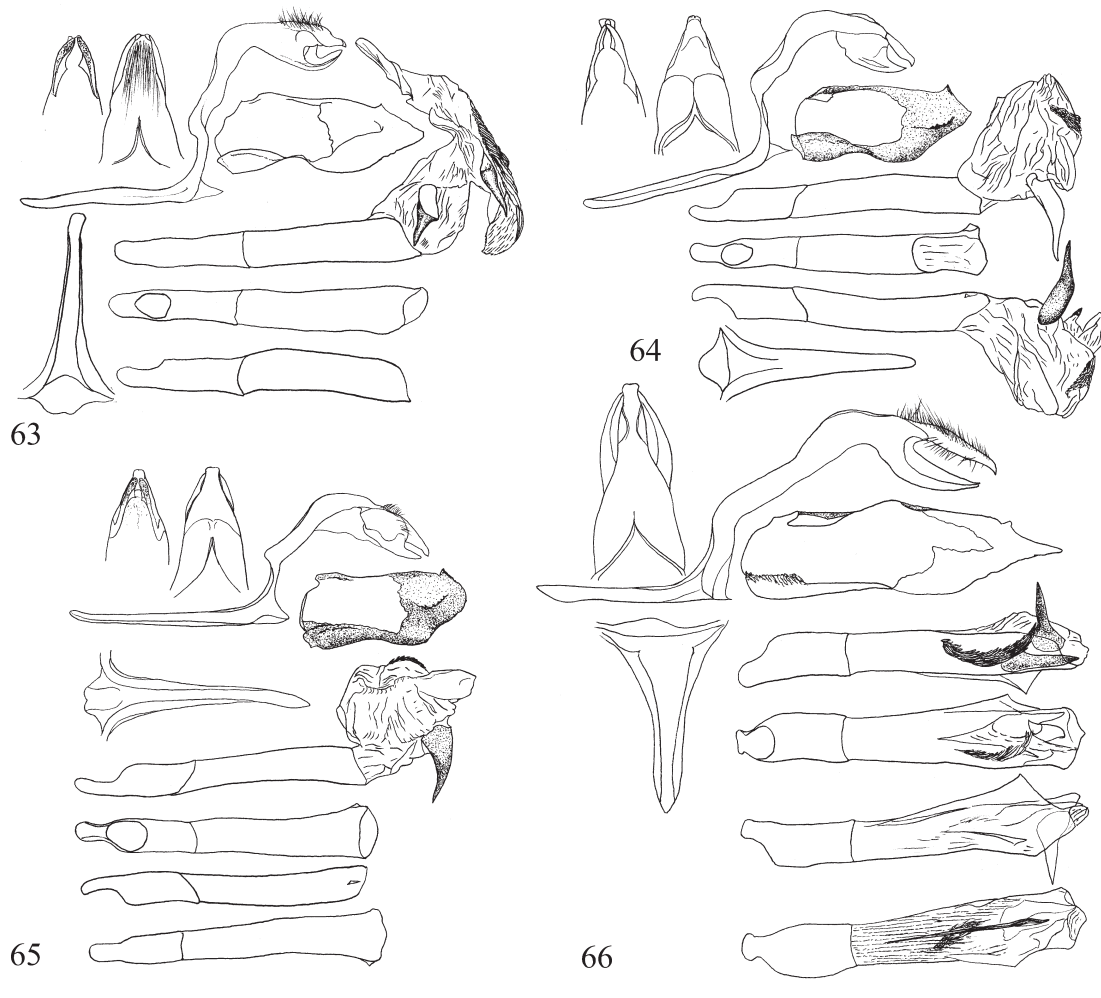
Genitalia (Fig. 93) - lamellae about as broad as long, caudal edge of lamella postvaginalis excavate centrally into relatively broad V-shape, lamella antevaginalis slightly narrower than lamella postvaginalis, caudal edge bilobate, lobes separated by shallow U-shaped excavation, ostium bursae about twice as broad as deep; ductus bursae short (1.6 mm including antrum), relatively straight (ventral and lateral views), and sclerotized; corpus bursae elongate, about 2 times as long as broad, indistinctly wrinkled longitudinally.

**Specimens examined. GUATEMALA:** Dept. Baja Verapaz; Chilasco, *leg.* Champion, no date (1 male; BMNH); Quetzal Reserve, "Los Ranchitos", 1680-1750m, 10-15 June 2007, *leg.* J. B. Heppner (1 male;



**Figure 61-62.** Stigmas of *Librita* and *Neposa* (see text). **61)** *L. librita*, Chiapas, Mexico; **62)** *N. heras*, Guerrero, Mexico.

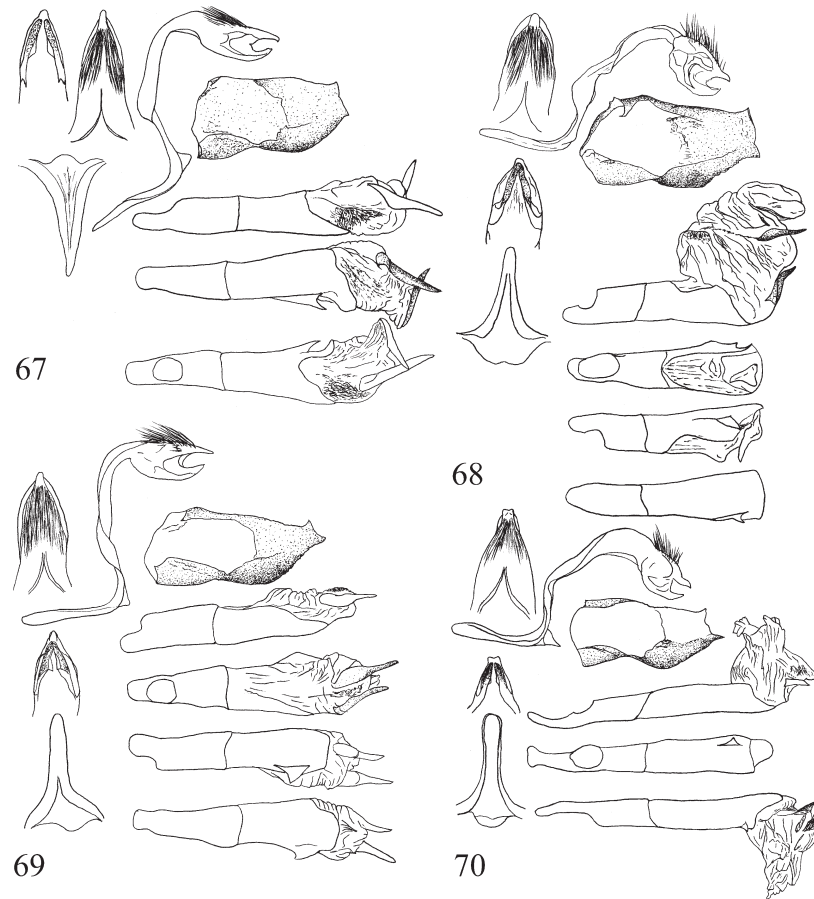




**Figure 63-66.** Male genitalia of *Onespa* (full data in text; shown are lateral view of uncus, gnathos, tegumen, and saccus; dorsal view of uncus and tegumen; ventral view of gnathos uncus; internal view of right valva; ventral view of saccus; ventral, dorsal, right lateral and/or left lateral views of aedeagus; scale bar = 1 mm). **63)** *O. nubis*, El Salvador (SRS #4803); **64)** *O. brockorum*, Sonora, Mexico, paratype (SRS #1852); **65)** *O. gala*, Michoacán, Mexico (GTA #14065); **66)** *O. nakamura*, Costa Rica, holotype (GTA #14033).

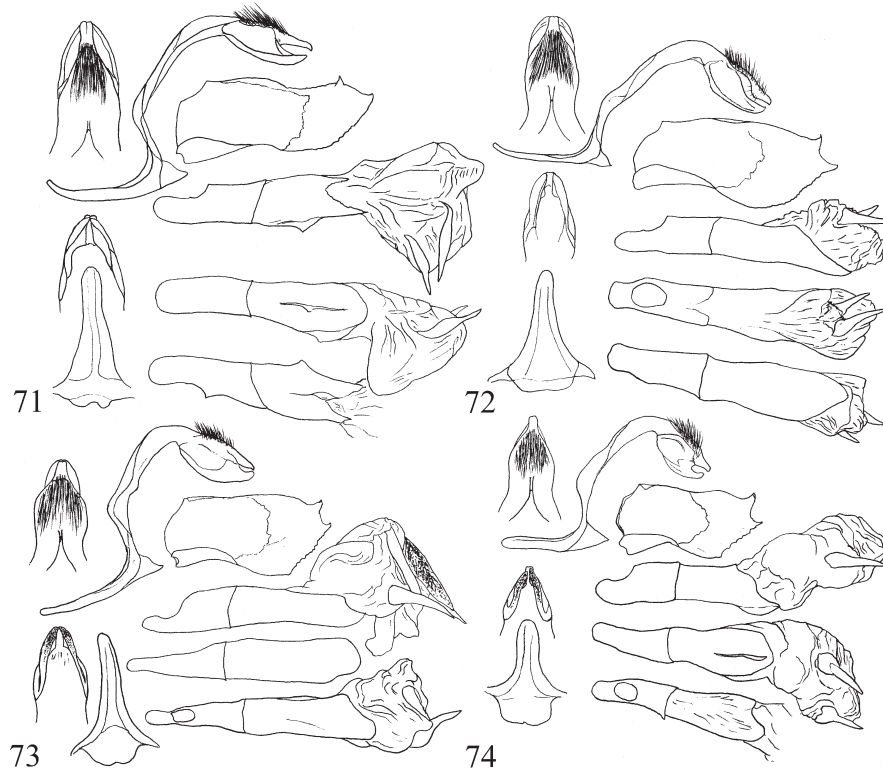
MGCL); **MEXICO:** no additional data (2 males; BMNH); **MEXICO:** Chiapas; Ochuc, 18-20 May 1972, *leg.* R. Wind (1 male; MGCL), same locality and collector, 21-24 May 1972 (2 males; MGCL), 15-18 October 1971 (2 males, LDM [slide] #2330, SRS #3426, 1 female; MGCL), 19-23 October 1971 (2 males, 2 females; MGCL); San Carlos, 25 May 1969, *leg.* R. Wind (1 male, SRS #3425; MGCL); San Cristobal las Casas, 15 September 1986 (1 male; MAZA); San Felipe, 3000', 5 August 1974, *leg.* R. Wind (1 male; MGCL); **MEXICO:** Distrito Federal; Pedregal, 27 May 1955, *leg.* C. Hoffmann (1 male; UNAM), same location and collector, June (1 male; UNAM), December 1961 (1 male; UNAM); Pedregal San Angel, Jardín Botánico, 9 October 1983, *leg.* J. Llorente (1 male; MZFC); Pedregal de Sta. Teresa Contreras, 5 May 1974, *leg.* P. Guzman E. (1 male; UNAM); Delegación Magdalena Contreras, Cañada de la Magdalena Contreras, Dinamo 1, 2670m, 28 May 1982, *leg.* A. Luis-M. (1 male; MZFC), same locality and collector, 23 December 1982 (1 male; MZFC); Delegación Miguel Hidalgo, 3ra. Secc. del Bosque de Chapultepec, 14 January 1993, *leg.* N. Figueroa (1 male; MHNM), same locality, 23 January 1993, *leg.* R. Lomeli (1 male, 2 females; MHNM), same locality and collector, 4 February 1993 (1 female; MHNM), 4 March 1993 (1 female; MHNM); 7 July 1992, *leg.* N. Figueroa (1 male; MHNM), 9 July 1992 (2 males, 4 females; MHNM); Delegación Miguel Hidalgo, 2da. Secc. del Bosque de Chapultepec, Viveros, 5 August 1992, *leg.* R. Lomeli (2 males; MHNM); Delegación Tlalpan, Colonia Bosque del Tlalpan, 11 June 2008, *leg.* A. D. Warren (1 male; ADWC); same





**Figure 67-70.** Male genitalia of *Buzyges* (full data in text; shown are lateral view of uncus, gnathos, tegumen, and saccus; dorsal view of uncus and tegumen; ventral view of gnathos uncus; internal view of right valva; ventral view of saccus; ventral, dorsal, right lateral and/or left lateral views of aedeagus; scale bar = 1 mm). **67)** *B. idothea*, Costa Rica (ADW #97-102); **68)** *B. rolla*, Costa Rica (GTA #14055); **69)** *B. benito*, Oaxaca, Mexico (SRS #4468); **70)** *B. mellanaformis*, Costa Rica, paratype (GTA #14031).

locality and collector, 17 June 2008 (1 male; ADWC); Vistas del Pedregal, 30 September 2008, *leg.* A. D. Warren (1 male; ADWC); same locality and collector, 9 October 2008 (1 female; ADWC), 20 October 2008 (1 male; ADWC); **MEXICO:** Durango: Mpio. El Salto, Hwy. 40 at Mesa Redonda, 2370m, 29 April 1998, *leg.* A. D. Warren (1 female; ADWC); **MEXICO:** Guerrero; July, no additional data, *leg.* R. Müller (2 males, 1 female; MHNH); Omilteme [Omitemi], 8000', July, *leg.* H. H. Smith (holotype male of *Augiades hecale*; BMNH); Xucumanatlan, July, *leg.* H. H. Smith (1 male; BMNH); **MEXICO:** México; Mpio. Zacualpan, Los Jarillos, 27 February 1987, *leg.* A. Luis-M (1 male; MZFC); Tres Cruces, 27 February 1987, *leg.* A. Luis-M (1 male; MZFC); **MEXICO:** Michoacán; Mpio. Uruapan, Cerro de la Cruz, 1800-2300m, 1 April 1997, *leg.* M. "Chimo" Martínez (1 male; ADWC), same locality, 9 July 1997, *leg.* M. "Chimo" Martínez (2 females; ADWC), 22 July 1996, *leg.* A. D. Warren (3 males; ADWC), 23 July 1997, *leg.* M. "Chimo" Martínez (2 males, 4 females; ADWC), 27 July 1996 *leg.* A. D. Warren (6 males, ADW #97-114, 4 females, ADW #97-113; ADWC); Rancho "La Alberca", Tereo El Alto, 2000m, 3 April 1994, *leg.* L. González-Cota (1 female; ADWC); **MEXICO:** Morelos; Chichinautzin, 2600m (RR tracks Tres Marias-Coajomulco), 22 April 1985, *leg.* I. Vargas-F. (1 male; MZFC); Tepoztlán, July 1975, *leg.* J. Llorente (2 males; MZFC); **MEXICO:** Oaxaca; 1 mi. S Jacatepec, 200', 16 September 1989, *leg.* J. Kemner (1 female, GTA #14137; MGCL); Rt 190, 13 km NW of Oaxaca, 22 December 1974, *leg.* E. C. Olson (1 male; MGCL); Rt 175, 8 km N of jct. Rt 190, 23 December 1974, *leg.* E. C. Olson (1 male; MGCL); Sta. Maria de Yavestia, 1970m, 29 May 2001, *leg.* A. Ibarra (1 male, 2 females; UNAM); **MEXICO:** Sinaloa; Durango-Villa Union Hwy. 40, 6500', 29 April 1966, *leg.* P. Hubbell (2 males, 1 female; AMNH); Loberas Summit, 5 mi. NE

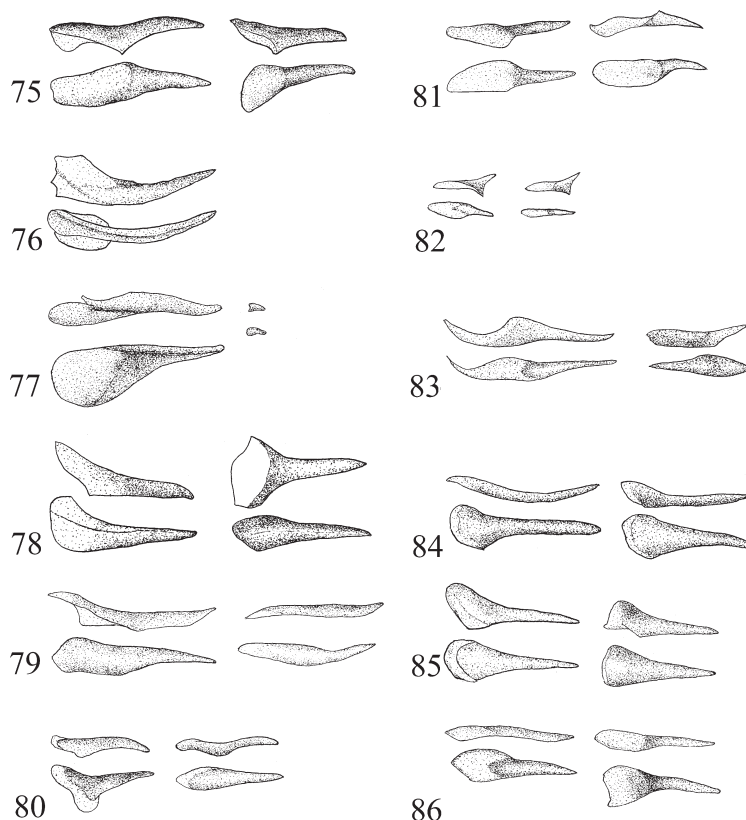


**Figure 71-74.** Male genitalia of *Librita* and *Neposa* (full data in text; shown are lateral view of uncus, gnathos, tegumen, and saccus; dorsal view of uncus and tegumen; ventral view of gnathos uncus; internal view of right valva; ventral, dorsal, right lateral and/or left lateral views of aedeagus; scale bar = 1 mm). **71)** *L. librita*, Chiapas, Mexico (SRS #3425); **72)** *N. armandoi*, Oaxaca, Mexico, holotype (GTA #14143); **73)** *N. heras*, Guerrero, Mexico (ADW #97-112); **74)** *N. isabelae*, Guatemala, paratype (ADW #98-15).

Potrerrillos, 1820m, parkland forest, 23 August 1973, *leg.* L. D. & J. Y. Miller (1 female; MGCL); Loberas (on Hwy. 40), 1900-1940m, 30 November 1996, *leg.* A. D. Warren (1 male; ADWC); 1 mi. west of El Palmito, 6300', October 1964, *leg.* P. Hubbell (1 male; AMNH); **MEXICO:** Sonora; Sierra del Gato, 5 May 1997, *leg.* J. P. Brock (1 male; JPBC); **MEXICO:** Veracruz; El Naranjal, Fortin, 27 March 1976 (1 male; MAZA); Jalapa, March, Schaus collection (4 males; BMNH), same location, November, *leg.* A. Hall (1 male; BMNH), same location, no date, J. T. Mason collection (1 male; DMNH); Presidio, July 1940, *leg.* T. Escalante (1 male; MGCL), same location and collector, July 1949 (1 male; MGCL).

**Distribution and phenology.** In Mexico, *Librita librita* occurs between about 1800 and 2700 m, from the Sierra Madre Occidental in Sonora, Sinaloa and Durango, through the Eje Neovolcanico (Michoacán, México State, Distrito Federal, Morelos, Veracruz) and Sierra Madre del Sur (Guerrero and Oaxaca) into Chiapas. It is also known with certainty from Guatemala (see discussion below) and may occur southward to Panama. This species has been recorded in all months. Adults fly year-round at least in the Valley of Mexico, although they appear to be most abundant during the local rainy season from about June through October. While widely distributed, populations of *L. librita* tend to be localized. Most populations occur in pine-oak habitats with ample sunny openings, although some (Delegación Tlalpan, Delegación Miguel Hidalgo, Distrito Federal) occur in relatively disturbed habitats adjacent to urban areas.

**Biological notes.** Males of *L. librita* guard perches from one to two meters above ground level, during sunny or mostly sunny periods, from about 11:00 h to at least 16:00 h. Both sexes feed at a variety of flowers. One female (in Durango State, April, 1998) was found at damp ground around a seep, at the peak of the local dry season. Grasses (Poaceae) are suspected larval foodplants of *L. librita* (*Chusquea* has not



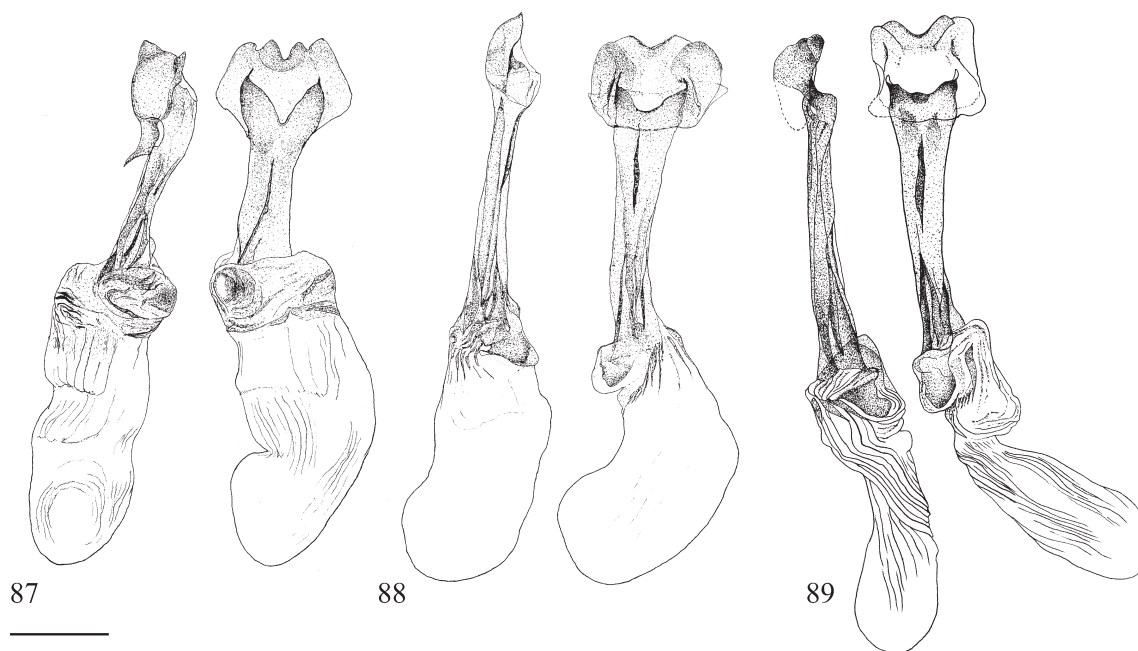
**Figure 75-86.** Rigid cornuti of *Onespa*, *Buzyges*, *Librita*, and *Neposa* (full data in text; shown are lateral and dorsal views). **75)** *O. nubis*, El Salvador (SRS #4803); **76)** *O. gala*, Michoacán, Mexico (GTA #14065); **77)** *O. brockorum*, Sonora, Mexico, paratype (SRS #1852); **78)** *O. nakamura*, Costa Rica, holotype (GTA #14033); **79)** *B. idothea*, Costa Rica (ADW #97-102); **80)** *B. rolla*, Costa Rica (GTA #14055); **81)** *B. benito*, Oaxaca, Mexico (SRS #4468); **82)** *B. mellanaformis*, Costa Rica, paratype (GTA #14031); **83)** *L. librita*, Veracruz, Mexico (GTA #14135); **84)** *N. heras*, Guerrero, Mexico (ADW #97-112); **85)** *N. armandoi*, Oaxaca, Mexico, holotype (GTA #14143); **86)** *N. isabelae*, Guatemala, paratype (ADW #98-15).

been observed in habitats where *L. librita* flies; A. Warren, pers. obs.), but oviposition has not yet been witnessed and specific foodplants remain unknown.

**Discussion of *Librita*.** Godman (1900, in Godman and Salvin 1879-1901) described *Augiades hecale* based on specimens from Mexico and that phenotype is known from Mexico and Guatemala (Evans 1955, this study) with no recent collections from elsewhere. This could potentially call into question the identity of those populations since the type of *Hesperia librita* was putatively from Panama (Plötz 1886). Godman (1907) fortunately established their synonymy. This suggests that either the type of *H. librita* was mislabeled or that the species has or may have had a broader distribution than collections indicate. Along with *A. hecale*, Godman and Salvin (1879-1901) placed another species, *Augiades heras* Godman, 1900, in *Augiades* Hubner, [1819]. Both were transferred to *Ochlodes* Scudder, 1872 (Hayward 1941, Hoffmann 1941), where they remained until Evans (1955) erected *Librita*.

Evans' (1955) characterization of the female of *Librita librita*, a specimen from Honduras, was of a largely brown phenotype allegedly similar to that of *Paratrytone rassa* and quite different from the male. More recent collections revealed that *L. librita* exhibits minor sexual dimorphism in its wing pattern and that Evans (1955) had not seen a female of *L. librita* and misidentified the Honduran female. That specimen is no longer associated with the series of *L. librita* at the BMNH (ADW, pers. obs.) and its identity remains unknown.

Several traits characterize *Librita* from both *Onespa* and *Buzyges*. Neither of those genera have a stigma. Although the general structure of both male and female genitalia show general similarities to



**Figure 87-89.** Female genitalia of *Onespa* (shown are left lateral and ventral views; scale bar = 1 mm). **87)** *O. nubis*, Oaxaca, Mexico (GTA #14056); **88)** *O. gala*, Michoacán, Mexico (GTA #14067); **89)** *O. brockorum*, Sinaloa, Mexico, paratype (SRS #4453).

both of those genera, they are also diagnostic. The aedeagus is short, stout and somewhat flattened on its dorsal surface. This differs from the more tube-like aedeagi of *Onespa* and *Buzyges* and the elongate aedeagus of *Onespa*. The cornuti of *Librita* are thin throughout, unlike the more robust cornuti of *Onespa* and *Buzyges*. Female genitalia differ from those of *Onespa* and *Buzyges* by the straight and relatively very short ductus bursae without the internal sclerotization of *Onespa* or the curvature dorsad of *Buzyges*. Although the lamella antevaginalis is broad as on both of those genera, its caudal edge is prominently bilobate. The lamella postvaginalis is much narrower on *Librita*, little broader than the lamella antevaginalis.

One remaining species placed in *Librita* by Evans (1955) is *Augiades heras*. Its superficial characters and genital morphology differ considerably from those of *L. librita*, and a new genus is erected for it and three other species below. This study thus continued the disassembly of *Librita* initiated by Mielke and Casagrande (2002), a genus that now appears as monotypic. Although *Librita* has been placed several genera removed from *Buzyges* (and *Onespa*) (Evans 1955, Warren et al. 2009), its genital characters indicate affinity with both *Buzyges* and *Onespa*.

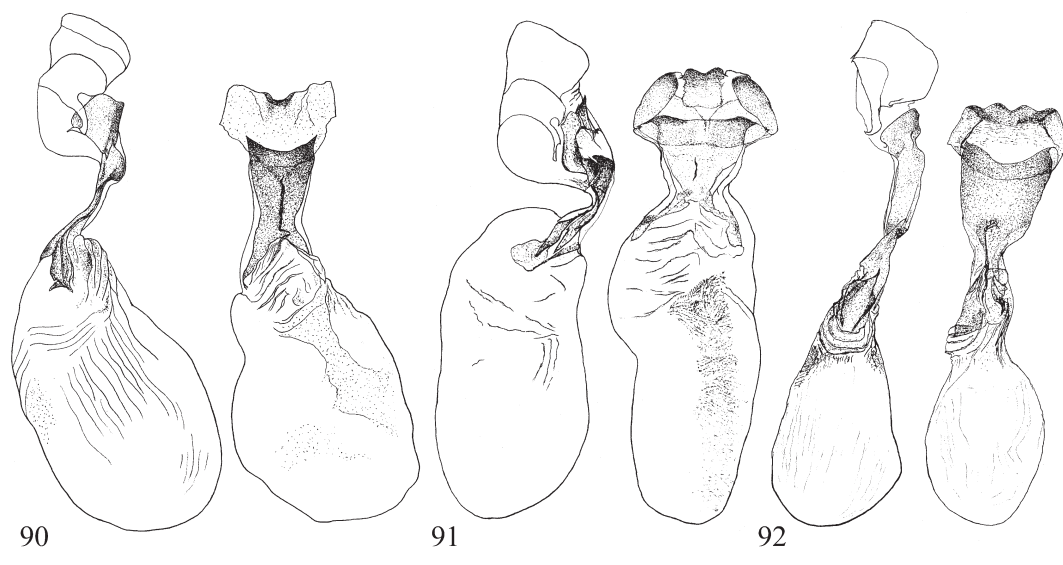
### ***Neposa* Austin and A. Warren, new genus**

Type species: *Neposa heras* (Godman, 1900), here designated.

The critical examination of *Librita* above confirmed that one species considered congeneric by Evans (1955), *Librita raspa*, was indeed a *Paratrytone* (see above), and revealed that a second species placed in *Librita*, *Augiades heras*, was also not congeneric. Since no existing genus is available for this, *Neposa* is here proposed and described to envelope *N. heras* and three undescribed species, all known from southern Mexico and northern Central America.

**Description.** Palpi quadrate, 3rd segment robust, nearly erect, not exceeding scales of second segment. Antennae more than 1/2 costa on males (51-53%), about 1/2 costa on females (48-49%); club stout, 1/3 or more of shaft (30-37% on males, 40-45% on females), bent to constricted apiculus beyond thickest part; nudum varies from 11 to 13 segments, subequally divided between club and apiculus (4-5 segments on





**Figure 90-92.** Female genitalia of *Buzyges* (full data in text; shown are left lateral and ventral views; scale bar = 1 mm). **90)** *B. idothea*, Costa Rica (SRS #3754); **91)** *B. rolla*, Costa Rica (GTA #14057); **92)** *B. mellanaformis*, Costa Rica, paratype (GTA #14058).

club); shaft entirely dark or yellow checked with black above, black and yellow or yellow-orange on venter; nudum red-brown to yellow-orange.

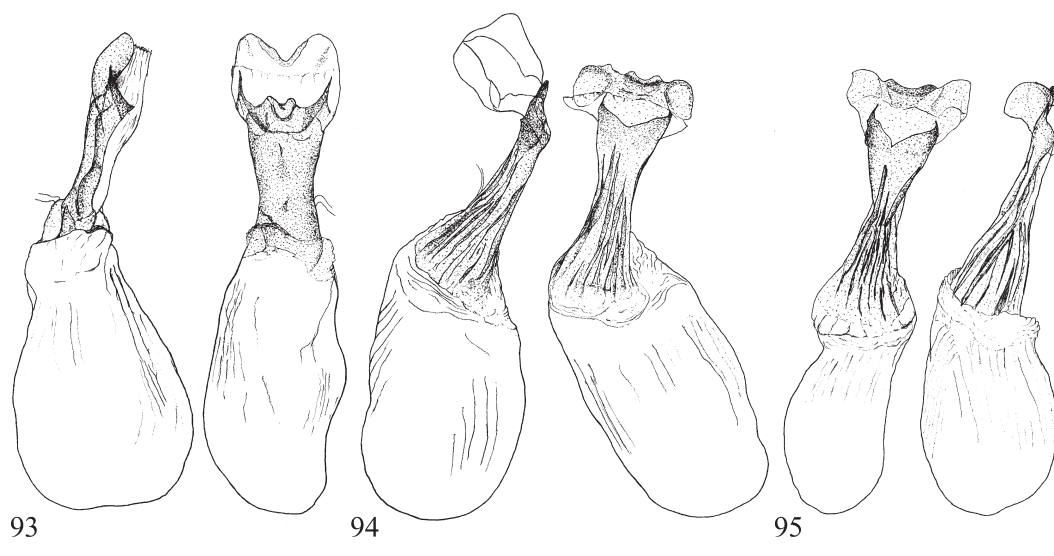
Wings somewhat produced; forewing apex 1.4 times length along vein 2A; hindwing longest at  $CuA_1$ , nearly as long at 2A, about equally long at veins  $Sc+R_1$  and 3A. Male with bipartite stigma (Fig. 62) flanked by a lower brush patch (*sensu* MacNeill 1964). Hindwing origin  $R_s$  nearer to cell end than base. Forewing origin  $CuA_2$  nearer to origin of  $CuA_1$  than to base of wing. Sexual dimorphism prominent. Wings dark brown with orange (male) or yellowish and/or orange and white (female) maculation.

Meso- and metatibiae spined with long fringes of setiform scales on both tibia and femur; mesotibiae with one pair spurs, metatibiae two pairs; outer spur in each pair 1/2 to 2/3 length of inner spur.

Male genitalia with gnathos bifid, arms slender and connivent, uncus short and narrow, weakly bilobed at end, narrower or about width of gnathos in dorsal view, longer or shorter than gnathos; separation of gnathos and uncus in lateral view shallow. Tegumen flaring cephalad, ventral arm with dorsal arm of saccus combining into a structure bent well below its middle, anterior arm of saccus short to moderately long, narrowing to a bluntly pointed or curved cephalic end in ventral view. Valvae simple and unarticulated, with costa/ampulla relatively straight and undifferentiated between themselves and harpe, ampulla with small dorsal triangular process caudad, harpe angled or curved, serrate on caudal edge before another sharply pointed process. Aedeagus stout, relatively short (1.1-1.4 times length of valva) one species with curved titillator on venter near caudal end, with cornuti consisting of two heavily sclerotized structures (narrowing abruptly caudad) and (on one species) a flexible, lightly sclerotized and spinulose pad.

Female genitalia characterized by a moderately long (2.3 mm), sclerotized, and centrally constricted, straight, and slightly twisted ductus bursae that expands cephalad in lateral view. Lamella antevaginalis very broad, lobate, and shallowly excavated caudad; lamella postvaginalis also broad with V-shaped caudal indentation; ostium bursae broad and shallow, twice as broad as deep. Corpus bursae wrinkled longitudinally, no signa.

**Etymology.** *Neposa* is a meaningless anagram of *Poanes* as was *Onespa* (Steinhauser 1974). The name was usurped from the notes of the late Steve Steinhauser (those now at MGCL). Steve apparently originally was to propose this name for a genus to embrace *Pamphila rolla* and *Poanes benito* (now included in *Buzyges*), which he, along with Burns (1992a), had recognized as not being species of *Poanes* (see above).



**Figure 93-95.** Female genitalia of *Librita* and *Neposa* (full data in text; shown are left lateral and ventral views; scale bar = 1 mm). **93)** *L. librita*, Oaxaca, Mexico (GTA #14137); **94)** *N. heras*, Guerrero, Mexico (ADW #97-111); **95)** *N. hestia*, Veracruz, Mexico, holotype (SRS #3738).

**Distribution and richness.** *Neposa* embraces *Augiades heras* and three undescribed species known from Guatemala and Mexico.

**Diagnosis and discussion.** Species of *Neposa*, although initially appearing similar to other hesperiines, including *Onespa* and *Buzyges*, have a unique combination of superficial and genital traits. *Augiades heras* was considered congeneric with *Librita* based largely upon their conspicuous stigmas and perhaps their somewhat similar valvae (Godman and Salvin 1879-1901, Evans 1955). Notwithstanding those similarities, *Neposa* differs from *Librita* by its bipartite stigma, presence of a lower brush patch, its overall brown color on the dorsal wings (*Librita* is a more obviously orange insect), spined tibiae, and numerous genital differences. Those latter include a shorter saccus, a more compact tegumen-uncus, a broad and often angled harpe, spike-like cornuti that expand cephalad on males, a broader sterigma, and a relatively longer, thinner, and twisted antrum with complex plate-like sclerotization on females.

*Neposa* differs from *Onespa* by its stigma, spined tibiae (note, however, that one species of *Onespa* has spined tibiae), shorter 2nd palpal segment, a broad and usually angled harpe, shorter and stouter aedeagus, and relatively shorter and twisted ductus bursae without a lateral pouch. It differs from *Buzyges* by the presence of a stigma, a shorter 2nd palpal segment, a broad and usually angled harpe, differently shaped cornuti, and a twisted ductus bursae with internal sclerotization.

#### ***Neposa heras* (Godman, 1900), new combination**

(Fig. 45-50, 62, 73, 84, 94)

*Augiades heras* Godman, 1900. Type locality: MEXICO: Guerrero; Omilteme [Omiltemi]; holotype male (Fig. 45-46) in Godman and Salvin collection at BMNH.

**Description. Male** (Fig. 45-48, 62) - mean forewing length = 15.0 mm (14.6-15.6 mm, n=7; from Guerrero and Oaxaca, Mexico); forewing apex pointed, termen convex; hindwing termen convex cephalad, slightly concave caudad before short tornal lobe; dorsum brown and orange; forewing with conspicuous, broad, and dark gray-brown bipartite stigma, oval in  $CuA_1$ - $CuA_2$  along posterior edges of  $CuA_1$  (prominently distad of its origin) and discal cell, not quite reaching base of cell and curving to  $CuA_2$ , separated by that vein from triangular element in  $CuA_2$ -2A, both elements entirely surrounded by modified black scales, these shiny cephalad of anterior element, lower brush patch black, prominent, extending caudad onto vein 2A; dorsal forewing with yellow-orange clearly defined in proximal 2/3 of costal cell, in most of  $Sc-R_1$

and  $R_1$ - $R_2$ , as quadrate subapical macules in  $R_3$ - $R_4$ ,  $R_4$ - $R_5$ , and  $R_5$ - $M_1$  (these overlapping and increasing in size caudad), near base of  $M_3$ - $CuA_1$ , at distal end of discal cell especially in posterior portion cephalad of stigma, proximad of stigma in  $CuA_2$ -2A, and in basal 3/4 of anal cell; other yellow-orange areas (discal cell, bases of cells from  $R_3$  to  $M_1$ , submarginally in  $M_2$ - $M_3$  and  $M_3$ - $CuA_1$ , distad of stigma in  $CuA_1$ - $CuA_2$ , and  $CuA_2$ -2A, and distad in anal cell) vague, variably mixed orange and brown scales; outer margin very dark brown (nearly black), broadest at apex; veins dark brown with vein 2A the darkest; fringe pale brown cephalad, yellow-orange caudad of 2A.

Dorsal hindwing brown with yellow-orange more or less quadrate macules in  $Rs$ - $M_1$  (smallest and somewhat offset proximad),  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ , and  $CuA_1$ - $CuA_2$ , and at distal end of discal cell, macule in  $M_1$ - $M_3$  partly divided by single line of brown scales; long orange setiform scales in base of discal cell, in proximal 3/4 of  $CuA_2$ -2A and densely along vein 2A nearly to termen; all margins very dark brown (nearly black), this extending from costa to base of  $Sc+R_1$ - $Rs$ ; fringe yellow-orange, mixed with brown cephalad.

Ventral forewing largely dull orange cephalad becoming red-brown distad, yellow-orange as subapical macules (as on dorsum) and more or less quadrate postmedial macules in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and anterior  $CuA_2$ -2A, the latter continued as poorly defined area of cream-colored scales to 2A; dark brown (nearly black) in base of discal cell, very base of  $M_3$ - $CuA_1$ , on either side of postmedial macules in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A, and entire anal cell; fringe pale brown cephalad, dull yellow-orange caudad of 2A.

Ventral hindwing largely dull orange, appears mottled by vaguely paler yellow-orange patches (beneath submarginal macules of dorsum and elsewhere), submarginal markings accentuated distad and less so proximad by small darker red-brown macules; mixed dark brown and orange in posterior  $CuA_2$ -2A and all of 2A-3A; long orange setiform scales along proximal 2/3 of vein 3A; fringe dull orange cephalad, yellow-orange caudad of 2A.

Dorsal head olive-orange, few white or pale orange scales above, behind, and beneath eye; palpi quadrate with olive-orange and a few black setiform scales on dorsum becoming yellow-orange mixed with black scales on sides and venter, 3rd segment black, stout, not exceeding scales of 2nd segment; antennae long (53% of costal length), entirely black on dorsum, venter black checked with yellow, the yellow broadening distad, club relatively long (37% of length of shaft), yellow and black, nudum red-brown, darker distad, 11 (n=2), 12 (n=2), or 13 (n=1) segments; dorsal thorax black entirely covered with olive-orange setiform scales; ventral thorax black, overscaled with dark orange setiform scales, pectus yellow-orange; legs olive-orange distad, brown proximad, olive setiform scales on femur, yellow-orange setiform scales on tibia; protibia smooth, red-brown epiphysis short, reaching junction with tarsus, mesotibia spined, single pair of spurs, outer 1/2 length of inner, metatibia spined, two pairs of spurs, outer about 1/2 length of inner; dorsal abdomen black entirely covered with olive-orange setiform scales, caudal end deep orange; ventral abdomen ochreous.

Genitalia (Fig. 73, 84) - uncus short, not hooked caudad in lateral view, entire and narrowing to blunt and slightly divided caudal end in dorsal view; gnathos shallowly separated from and slightly longer than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, broader than uncus caudad; tegumen narrow in lateral view, centrally expanded in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent well ventrad of its middle; anterior arm of saccus of moderate length and thin, straight, slightly shorter than length of uncus and dorsal portion of tegumen, moderately broad caudad in ventral view, narrowing gradually to blunt point cephalad; valva simple, no differentiation between costa and ampulla, latter produced dorso-caudad to small pointed triangular and slightly incurved process near juncture with harpe, harpe angled caudad, caudal edge finely serrate before another small, pointed, and slightly curved inward triangular process that is oriented dorso-caudad, sacculus narrow, ventral edge of valva concave cephalad of middle; aedeagus straight, stout, about 1.3 times length of valva, caudal end slightly expanded and asymmetrically rounded, no titillator; vesica with cornuti including an elongate and lightly sclerotized flexible spinulose pad and two heavily sclerotized structures, these broad cephalad (when extruded) and narrow abruptly to long, sharply pointed, and spike-like caudal ends.

**Female** (Fig. 49-50) - forewing length = 15.6, 16.0 mm (N=2; from Guerrero, Mexico); forewing apex less pointed than on male, termen convex (more so than on male); hindwing termen convex cephalad (more so than on male), slightly concave caudad before weakly lobate tornus; dorsum dark brown; sparse yellow-orange overscaling basad, more dense yellow-orange overscaling in middle 1/2 of anal cell; translucent white macules as follows: subapical in  $R_3$ - $R_4$ ,  $R_4$ - $R_5$ , and  $R_5$ - $M_1$ , quadrate and overlapping, increasing

in size caudad; postmedial  $M_3$ - $CuA_1$ , quadrate, offset distad and not overlapping larger quadrate macule in  $CuA_1$ - $CuA_2$ , hourglass-shaped at distal end of discal cell, latter three macules narrowly outlined with orange; opaque pale yellow-orange macule mid-cell in posterior  $CuA_2$ -2A; fringe pale brown mixed with yellow-orange cephalad, pale yellow-orange caudad of 2A.

Dorsal hindwing largely brown, yellow-orange submarginal macules from Rs to mid-cell  $CuA_2$ -2A, that in Rs- $M_1$  offset proximad from remainder of series, divided in  $M_1$ - $M_3$  by single line of brown scales; sparse long pale orange setiform scales in base of discal cell, in proximal 3/4 of  $CuA_2$ -2A and more densely along vein 2A nearly to termen; fringe pale brown mixed with dull yellow-orange.

Ventral forewing largely orange-brown cephalad, macules as on dorsum except that in 2A duller; black in base of Sc- $R_1$ ,  $R_1$ - $R_2$ , and in discal cell to distal macule; black in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A proximad of macules; dark brown (nearly black) in  $CuA_1$ - $CuA_2$  distad of macule to about 1/2 distance to termen, distad in  $CuA_2$ -2, and in entire anal cell; fringe brown cephalad, dull yellow-orange caudad of 2A.

Ventral hindwing as on male, but duller; fringe pale brown cephalad, dull yellow-orange caudad of 2A.

Dorsal head olive-orange, few white or pale orange scales above and behind and pale yellow below eye; palpi quadrate, olive-orange and a few black setiform scales on dorsum becoming yellow-orange mixed with black scales on sides and venter, 3rd segment black, stout, not exceeding scales of 2nd segment; antennae of moderate length (49% of costal length), entirely black on dorsum, venter black checked with yellow, yellow broadening distad, club long (45% of length of shaft), yellow and black, nudum red-brown, darker distad, 11 (n=2) segments; dorsal thorax black covered with pale orange setiform scales; ventral thorax black with olive-orange setiform scales, pectus yellow-orange; legs olive-orange distad, brown proximad with yellow-orange setiform scales on femur and tibia, protibia smooth, red-brown epiphysis reaching beyond junction with tarsus, mesotibia spined, single pair of spurs, outer 1/2 length of inner, metatibia spined, two pairs of spurs, outer about 2/3 length of inner.

Genitalia (Fig. 94) - lamellae broad, caudal edge of lamella postvaginalis lobate, lobes separated narrowly by shallow U-shaped excavation, lamella antevaginalis narrower than lamella postvaginalis, excavate centrally into broad V-shape, ostium bursae about twice as broad as deep; ductus bursae sclerotized, broad in ventral view and relatively long (2.3 mm including antrum), slightly constricted in middle, relatively straight in ventral view but somewhat twisted to left, straight and expanding cephalad in lateral view, numerous thin internal sclerotized plates; corpus bursae broad, less than 2 times as long as broad, weakly wrinkled longitudinally.

**Specimens examined.** **MEXICO:** no further data (1 male; BMNH); **MEXICO:** Guerrero; Mpio. Atoyac, La Golondrina, 1800m, 28 January 1987, *leg.* A. Luis-M. (1 male; MZFC), same locality and collector, 23 February 1984 (1 male; MZFC), 31 March 1983 (3 males; MZFC); Mpio. Chilpancingo, Omiltemi, 2300m, 18 January 1984, *leg.* A. Luis-M. (1 male; MZFC), same locality and collector, 17 March 1985 (1 male; MZFC), 20 November 1984 (1 male; MZFC); Omilteme [Omiltemi], 8000', July, *leg.* H. H. Smith (3 males including holotype; BMNH); Mpio. Tlacotepec, El Iris, 2100m, 10 January 1983, *leg.* A. Luis-M. (1 male; MZFC), same locality and collector, 29 March 1983 (4 males; MZFC), 4 December 1984 (2 males; MZFC); Camino a Palohueco, 20 October 1985, *leg.* A. Luis M. (1 female; MZFC); El Chayotillo, 2450m, 3 April 1985, *leg.* A. Luis-M. (2 males; MZFC); Laguna de Agua Fria, 31 May 1985 (2 males; MZFC), same location, 1 June 1985, in fermenting fruit bait trap (1 female, ADW #97-111; MZFC), 19 October 1985 (1 male; MZFC), 24 October 1985 (6 males; MZFC), 7 November 1985 (6 males, ADW #97-112; MZFC); Presa la Perra, 3 November 1985, *leg.* A. Luis-M. (1 male; MZFC); **MEXICO:** Oaxaca: Mpio. San Mateo Río Hondo, Manzanal-Doncella, 2680m, 26 November 2007, M. Trujano Ortega (1 male; MZFC); Mpio. San Miguel Suchixtepec, Hwy. 175, Arroyo Puente El Guajolote, 2050-2150m, 18 October 2008, *leg.* A. D. Warren (1 male; ADWC).

**Distribution and phenology.** This species is known only from the Sierra Madre del Sur of Guerrero and Oaxaca, Mexico, at elevations between 1800 and 2680 m. It has been recorded in all months except August and September, but mostly from October to March (16 of 20 records, 32 of 40 specimens).

**Biological notes.** *Neposa heras*, together with other taxa of *Neposa*, is very rare in collections. Before its rediscovery in 1983 by field workers from the MZFC, this species was known only from the five males in the BMNH (Evans 1955), three of which are the original types, from Omiltemi, Sierra de Atoyac (Sierra Madre del Sur), Guerrero. Between January 1983 and January 1987, MZFC researchers collected



33 males and two females of *N. heras*, all in a small region centered around its type locality. It was thus a surprise when *N. heras* was taken in the Sierra Madere del Sur of Oaxaca in November of 2007 and October of 2008. While *N. heras* appears to be locally abundant in the Omiltemi region, the same cannot be said about its occurrence in Oaxaca. The Sierra Madre del Sur of Oaxaca has been studied by lepidopterists for several years (e.g., Miller 1972, de la Maza and Díaz 1978, Miller and Miller 1979, Miller and Rotger 1979, de la Maza and Lamas 1982, de la Maza and de la Maza 1983), including recently for HesperIIDae (e.g., Burns 1992b). Despite this attention, *N. heras* escaped detection in that area until 2007. Available records suggest that *N. heras* occurs in the coniferous forests of the Sierra Madre del Sur of Oaxaca at least between 2050 and 2680 m, but is apparently quite scarce there. The single live male observed by the junior author (Arroyo Puente El Guajolote, 18 October, 2008) was perching in a small sunny opening in montane coniferous forest, at about 13:00 h, nearly one meter above ground level. This site contains several grasses including *Chusquea*.

**Discussion.** The male of *Neposa heras* and its genitalia were well illustrated with its original description (Godman and Salvin 1879-1901); male genitalia were subsequently illustrated, rather poorly, by Evans (1955). Females, not previously described or illustrated, are very different from their male, exhibiting dimorphism similar to that seen in a number of species treated earlier herein. These are very dark dorsally with white and orange macules, resembling several other species occurring at higher elevations (see discussion of *Onespa* above).

***Neposa hestia* Austin and A. Warren, new species**  
(Fig. 51-52, 95)

**Description. Male** – unknown.

**Female** (Fig. 51-52) - forewing length = 16.8 mm (n=1, holotype); forewing apex more or less pointed, termen convex; hindwing termen convex cephalad, slightly concave caudad before weakly lobate tornus; dorsum dark brown; sparse orange overscaling basad, prominent along proximal 1/2 of costa, dense yellow-orange overscaling in proximal 2/3 of anal cell; translucent white macules as follows: subapical in  $R_3$ - $R_4$ ,  $R_4$ - $R_5$ , and  $R_5$ - $M_1$ , quadrate and overlapping, increasing in size caudad; postmedial  $M_3$ - $CuA_1$ , trapezoidal, offset distad and not overlapping larger quadrate macule in  $CuA_1$ - $CuA_2$ ; hourglass-shaped at distal end of discal cell, latter three macules narrowly outlined with orange; opaque yellow-orange macule mid-cell in posterior  $CuA_2$ -2A; fringe pale brown cephalad, pale yellow-orange caudad of 2A.

Dorsal hindwing largely brown, orange submarginal macules from  $R_s$  to mid-cell  $CuA_2$ -2A, that in  $R_s$ - $M_1$  offset proximad from remainder of series, divided in  $M_1$ - $M_3$  by single line of brown scales; sparse long pale orange setiform scales in base of discal cell (where some have greenish tinge), in proximal 3/4 of  $CuA_2$ -2A and more densely along vein 2A nearly to termen; fringe dull orange cephalad, pale yellow-orange caudad of 2A.

Ventral forewing largely orange-brown cephalad, macules as on dorsum except that in 2A is whitish; black in base of  $Sc$ - $R_1$ , in discal cell to distal macule; black in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A proximad of macules; dark brown (nearly black) in  $CuA_1$ - $CuA_2$  distad of macule to about 1/2 distance to termen, distad in  $CuA_2$ -2, and in entire anal cell; fringe orange-brown cephalad, dull pale yellow-orange caudad of 2A.

Ventral hindwing largely orange, appears mottled by vaguely paler yellow-orange patches (beneath submarginal macules of dorsum, along outer margin, and elsewhere), submarginal markings accentuated distad by small darker red-brown macules; mixed dark brown and orange in posterior  $CuA_2$ -2A and all of 2A-3A; long orange setiform scales along proximal 2/3 of vein 3A; fringe yellow-orange cephalad, paler caudad of 2A.

Dorsal head orange, few pale orange scales above, behind, and beneath eye; palpi quadrate, orange and a few black setiform scales on dorsum becoming yellow-orange mixed with black scales on sides and venter, 3rd segment black, stout, not exceeding scales of 2nd segment; antennae of moderate length (48% of costal length), dull orange on dorsum, venter yellow and checked with black, black broadest proximad, club of moderate length (40% of length of shaft), yellow-orange and black, nudum red-brown, darker distad, 11 (n=1) segments; dorsal thorax black, somewhat rubbed but apparently entirely covered with orange setiform scales; ventral thorax black, overscaled with dark orange setiform scales, pectus yellow-orange; legs orange distad, brown proximad, pale orange setiform scales on femur and tibia, protibia

smooth, red-brown epiphysis short, reaching junction with tarsus, mesotibia spined, single pair of spurs, outer 1/2 length of inner, metatibia spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen dark brown; ventral abdomen ochreous and fulvous.

Genitalia (Fig. 95) - lamellae broad, caudal edge of lamella postvaginalis lobate, lobes broadly separated by shallow U-shaped excavation, lamella antevaginalis narrower than lamella postvaginalis, deeply excavate centrally into broad V-shape, ostium bursae about twice as broad as deep; ductus bursae sclerotized, broad in ventral view and relatively long (2.3 mm including antrum), constricted in middle, relatively straight in ventral view but slightly twisted to left, straight and expanding cephalad in lateral view, numerous very thin internal sclerotized plates; corpus bursae broad, less than 1.5 times as long as broad, weakly wrinkled longitudinally.

**Type.** Holotype female with the following labels: white, handprinted - / Mex: Veracruz / road above / Las Minos / 8 April 1990 / John Kemner / el. 9000' /, white, printed and handprinted - / Allyn Museum Photo / No. 90721, 21A1 / 19, 20 /, white, printed and handprinted - / Allyn Museum / Acc. 1990-12 /, white, printed and handprinted - / Genitalia Vial / SRS-3738 /, white, printed - / MGCL/FLMNH / Specimen no. / 34058 /, and red, printed - / HOLOTYPE / *Neposa hestia* / Austin & A. Warren /. Deposited at MGCL.

**Type locality.** MEXICO: Veracruz, road above Las Minas (misspelled Las Minos on label), 9000'.

**Etymology.** In Greek mythology, Hestia was the goddess of the hearth and sister of Hera, after which a very similar species, *N. heras* was apparently named. This alludes to the close relationships of these two species.

**Distribution and phenology.** The species is known only from the type taken in April.

**Diagnosis and discussion.** With the paucity of material, an attempt to superficially distinguish *N. hestia* from *N. heras* is perhaps premature. These only suggest that *N. hestia* is larger than *N. heras*, has smaller macules on both the dorsal forewing and hindwing, and is more orange on the venter compared with the olivish aspect of *N. heras*. The genitalia, however, are diagnostic. Female *N. hestia* have the caudal lobes on the lamella postvaginalis more broadly spaced than on *N. heras*, the lamella antevaginalis is more deeply excavate, and the ductus bursae is more constricted centrally in ventral view and has thinner internal sclerotized plates. Additionally, the corpus bursae of *N. hestia* appears shorter and more compact.

***Neposa armandoi* Austin and A. Warren, new species**  
(Fig. 57-60, 72, 85)

**Description. Male** (Fig. 57-60) - forewing length = 14.1, 14.8 mm (n=2); forewing weakly produced with pointed apex, termen slightly convex, conspicuous, broad, and dark brown bipartite stigma, oval in  $CuA_1$ - $CuA_2$  along posterior edge of discal cell from proximad of origin of  $CuA_1$ , not reaching base of cell, but curving to vein  $CuA_2$ , divided by that vein from more or less triangular element in  $CuA_2$ -2A, narrowing caudad and reaching 2A, anterior element margined cephalad and proximad and posterior element margined cephalad by shining modified black scales, lower brush patch black extending caudad onto vein 2A and into anterior portion of anal cell; hindwing convex, weakly lobate at tornus; dorsal forewing black marked with yellow-orange; moderately broad black outer margin, broadest at tornus where occupying distal 1/3 of anal cell; orange macules as follows: quadrate subapical in  $R_3$ - $R_4$ ,  $R_4$ - $R_5$ , and  $R_5$ - $M_1$ , increasing in size caudad; small submarginal macules in  $M_1$ - $M_2$  and  $M_2$ - $M_3$ ; postmedial in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ ,  $CuA_2$ -2A, and anal cell, latter continued proximad on anal margin by orange setiform scales; orange in costal cell and most of  $Sc$ - $R_1$ , proximal 1/2 of discal cell, and (as overscaling) proximad of stigma in  $CuA_2$ -2A; fringe pale gray-brown cephalad, yellow-orange from mid- $CuA_2$ -2A to tornus.

Dorsal hindwing also black marked with yellow-orange; outer margin black, narrow cephalad and increasing in width caudad; costal and anal margins black; yellow-orange submarginal macules in  $Rs$ - $M_1$ ,  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and anterior portion of  $CuA_2$ -2A, that in  $M_1$ - $M_3$  partially divided by single line of brown scales; oval yellow-orange macule in discal cell; base of wing overscaled with yellow-orange

setiform scales in discal cell,  $CuA_1$  -  $CuA_2$  and  $CuA_2$ -2A; dense orange setiform scales along vein 2A nearly to termen; fringe yellow-orange, slightly yellower at tornus.

Ventral forewing largely orange, yellow-orange as subapical macules (as on dorsum), apical area, and more or less quadrate postmedial macules in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and  $CuA_2$ -2A, the latter becoming yellow towards 2A; black in base of discal cell, very base of  $M_3$ - $CuA_1$ , on either side of postmedial macules in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A, and entire anal cell; fringe orange-brown cephalad, yellow caudad of mid- $CuA_2$ -2A.

Ventral hindwing largely yellow-orange, appears mottled by vaguely paler yellow-orange patches (beneath submarginal macules of dorsum and elsewhere), submarginal markings accentuated distad and proximad by small darker red-brown macules, this color also in base of discal cell; mixed black and yellow-orange in posterior  $CuA_2$ -2A and all of 2A-3A, anal cell mixed yellow-orange and red-brown; long orange setiform scales along proximal 2/3 of vein 3A; fringe dull orange-brown cephalad, yellow-orange caudad of  $CuA_2$ .

Dorsal head olive, red-brown above, cream color behind and pale red-brown beneath eye; palpi quadrate, red-brown with a few black setiform scales on dorsum becoming pale yellow-orange mixed with a few black scales on sides and venter, 3rd segment black, stout, not exceeding scales of 2nd segment; antennae long (55% of costal length), black checked with yellow-orange, yellow broader on venter and distad, club relatively long (32% of length of shaft), orange and black, nudum pale red-brown, distal segment brown, 11 (n=2) segments; dorsal thorax black entirely covered with red-brown setiform scales, ventral thorax black overscaled with olive-orange setiform scales; pectus pale yellow-orange; legs brown proximad, orange distad, yellow-orange setiform scales on tibia and femur, protibia smooth, red-brown epiphysis small, reaching junction with tarsus, mesotibia spined, single pair of spurs, outer about 1/2 length of inner; metatibia spined, two pairs of spurs, outer about 1/2 length of inner, dorsal abdomen black, entirely overscaled with olive-orange setiform scales, caudal end olive-orange; ventral abdomen cream color.

Genitalia (Fig. 72, 85) - uncus short, not hooked caudad in lateral view, entire and narrowing to blunt and slightly lobate caudal end in dorsal view; gnathos shallowly separated from and about the length of uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, broader than uncus caudad; tegumen narrow in lateral view, centrally expanded in dorsal view and flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure bent well ventrad of its middle; anterior arm of saccus of long and thin, slightly curved dorsad, longer than length of uncus and dorsal portion of tegumen, moderately broad caudad in ventral view, narrowing gradually to blunt point cephalad; valva simple, no differentiation between costa and ampulla, latter produced dorso-caudad to small pointed triangular and slightly incurved process near juncture with harpe, harpe broadly curved caudad, caudal edge finely serrate before another small, pointed, and slightly curved inward triangular process that is oriented nearly caudad, sacculus narrow, ventral edge of valva concave cephalad of middle; aedeagus straight, stout, about 1.1 times length of valva, caudal end slightly expanded and asymmetrically pointed, no titillator; vesica with cornuti including two heavily sclerotized structures, these broad cephalad (when extruded) and narrow abruptly to long, sharply pointed, and spike-like caudal ends.

**Female** – unknown.

**Types.** Holotype male with the following labels: white, printed - / MEXICO: OAXACA: / Mpio. San Mateo Río Hondo: / San Jose del Pacifico, / Hotel Puerta del Sol, ca. / 2400m, 23-IX-2007 / Omar Ávalos Hernández /; white, printed and handprinted - / Genetalic Vial / GTA – 14143 /; red, printed - / HOLOTYPE / *Neposa armandoi* / Austin & A. Warren /, deposited at MZFC. Paratype – MEXICO: Oaxaca; Mpio. San Mateo Río Hondo, 1 km S San Jose del Pacifico, 2280-2400m, 25 October 2008, leg. A. D. Warren (1 male; ADWC).

**Type locality.** MEXICO: Oaxaca; Mpio. San Mateo Río Hondo, San Jose del Pacifico, Hotel Puerta del Sol, ca. 2400 m. This site is situated in montane coniferous forest along Hwy. 175. The small cabins at the hotel are popular with foreign tourists to the area.

**Etymology.** This species is named in honor of Armando Luis-Martínez of Mexico City, Mexico. Armando has been a leading researcher in efforts to document Mexico's butterfly diversity for over two decades, and has been a friend and close colleague of the junior author for 15 years.

**Distribution and phenology.** To date, *N. armandoi* is known only from the vicinity of San Jose del Pacifico, in the Municipality of San Mateo Río Hondo, in the Sierra Madre del Sur of Oaxaca, along Hwy. 175, between 2280 and 2400 m. Both known specimens were collected during the local rainy season of September, 2007 and October, 2008.

**Biological notes.** The male *N. armandoi* taken by the junior author was perching in a small sunny opening, at the junction of two trails along a creek in montane coniferous forest, about one meter above ground level, at about 10:00 h. Various grasses are common in this habitat, although no *Chusquea* was observed.

**Diagnosis and discussion.** *Neposa armandoi* is nearly the size of *N. heras*, but appears more orange since the entire postmedial series of macules on the forewing is well-developed. Similarly, the ventral forewing has broader expanses of orange at the expense of black compared to that wing of *N. heras*. Male genitalia of the two species, although having a similar gestalt, exhibit several differences. On *N. armandoi*, the gnathos is nearly the length of the uncus whereas it is longer than the uncus on *N. heras*. The valva of *N. armandoi* is conspicuously longer and broader than on *N. heras*, and is curved (vs. angled).

***Neposa isabelae* Austin and A. Warren, new species**

(Fig. 53-56, 74, 86)

**Description. Male** (Fig. 53-56) - forewing length = 12.7, 14.0 mm (n=2, from Guatemala); forewing weakly produced with pointed apex, termen slightly convex, conspicuous, broad, and dark brown bipartite stigma, oval in  $CuA_1$ - $CuA_2$  along posterior edge of discal cell from proximad of origin of  $CuA_1$ , not reaching base of cell, but curving to vein  $CuA_2$ , divided by that vein from more or less oval element in  $CuA_2$ -2A, diagonally across cell to vein 2A proximad, both elements surrounded by modified black scales, these shiny cephalad of anterior element, lower brush patch black, extending caudad onto vein 2A; hindwing convex, weakly lobate at tornus; dorsal forewing black marked with yellow-orange; moderately broad black outer margin, broadest apically and especially at tornus where occupying distal 1/3 of anal cell; orange macules as follows: quadrate subapical in  $R_4$ - $R_5$  (smallest) and  $R_5$ - $M_1$  (about 2-3 times as large); small in mid- $M_2$ - $M_3$ ; postmedial in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ ,  $CuA_2$ -2A, and anal cell; orange overscaling in costal cell, proximal portion of Sc- $R_1$ , distal portion of  $R_1$ - $R_2$ , in discal cell cephalad of stigma and basad, proximad in  $CuA_2$ -2A; fringe pale brown, yellow-orange from mid- $CuA_2$ -2A to tornus.

Dorsal hindwing also black marked with yellow-orange; outer margin black, narrow cephalad and increasing in width caudad; anal margin black; costal margin black; yellow-orange submarginal macules in  $Rs$ - $M_1$ ,  $M_1$ - $M_3$ ,  $M_3$ - $CuA_1$ , and  $CuA_1$ - $CuA_2$ , that in  $M_1$ - $M_3$  partially divided by single line of brown scales; small yellow-orange macule in mid-discal cell; base of wing overscaled with yellow-orange setiform scales in discal cell,  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A; dense orange setiform scales along vein 2A nearly to termen; fringe yellow-orange, slightly yellower at tornus.

Ventral forewing largely orange, yellow-orange as subapical macules (as on dorsum), apical area, and more or less quadrate postmedial macules in  $M_3$ - $CuA_1$ ,  $CuA_1$ - $CuA_2$ , and anterior  $CuA_2$ -2A, the latter continued as poorly defined area of mixed dark brown and cream-colored scales to 2A; dark brown (nearly black) in base of discal cell, very base of  $M_3$ - $CuA_1$ , on either side of postmedial macules in  $CuA_1$ - $CuA_2$  and  $CuA_2$ -2A, and entire anal cell; fringe orange-brown cephalad, yellow caudad of 2A.

Ventral hindwing largely orange, appears mottled by vaguely paler yellow-orange patches (beneath submarginal macules of dorsum and elsewhere), submarginal markings accentuated distad and proximad by small darker red-brown macules; mixed dark brown and orange in posterior  $CuA_2$ -2A, all of 2A-3A, and proximal 1/3 of anal cell; long orange setiform scales along proximal 2/3 of vein 3A; fringe dull orange-brown cephalad, yellow-orange caudad of 2A.

Dorsal head olive-orange mixed with a few black setiform scales, red-brown above and behind and yellow-orange beneath eye; palpi quadrate with olive-orange and a few black setiform scales on dorsum



becoming pale orange mixed with black scales on sides and pale yellow-orange on venter, 3rd segment black, stout, not exceeding scales of 2nd segment; antennae long (51% of costal length), black checked narrowly with yellow-orange on dorsum, pale yellow-orange, checked narrowly with black on venter, club relatively stout (30% of length of shaft), club black with some pale yellow-orange scaling especially on venter, nudum yellow-orange, distal segment brown, 11 (n=1) or 12 (n=1) segments; dorsal and ventral thorax black and covered with olive-orange setiform scales, pectus ochreous; legs brown proximad, orange distad with long pale yellow-orange setiform scales on femorae and tibiae, protibia smooth, red-brown epiphysis small, mesotibia spined, single pair of spurs, outer spur broken, metatibia spined, two pairs of spurs, outer about 2/3 length of inner; dorsal abdomen black covered with olive-orange setiform scales, caudal end yellow-orange; ventral abdomen pale yellow-orange.

Genitalia (Fig. 74, 86) - uncus very short, not hooked caudad in lateral view, entire and narrowing to weakly lobed caudal end in dorsal view; gnathos robust, shallowly separated from and shorter than uncus in lateral view, divided with arms slender, widely apart cephalad and approaching caudad in ventral view, about width of uncus caudad; tegumen thin in lateral view, centrally expanded in dorsal view, flaring cephalad, ventral arm combining with dorsal arm of saccus, this combined structure broadest and curved well ventrad of its middle; anterior arm of saccus relatively short and thin, mostly straight, shorter than length of uncus and dorsal portion of tegumen, moderately broad in ventral view, sides more or less parallel before bluntly rounded cephalic end; valva simple, no differentiation between costa and ampulla, latter produced dorsally to pointed triangular and slightly incurved process near juncture with harpe, harpe angled caudad with finely serrated caudal edge before another sharply pointed and incurved triangular process oriented caudad, sacculus narrow, ventral edge of valva prominently concave cephalad of middle; aedeagus straight and stout, expanded caudad, about 1.2 times length of valva, caudal end angled in ventral view, curved titillator on venter just cephalad of caudal end; vesica with two heavily sclerotized cornuti, these broad cephalad (when extruded), narrowing abruptly and sharply pointed and spike-like caudad.

**Female** – unknown.

**Types.** Holotype male with the following labels: white, printed and handprinted - / GUATEMALA: / Mpio. Acatenango, / Quisache, Chimalt- / enango – 1750 m. / X – 22 – 65 / E. C. Welling /; red, printed - / HOLOTYPE / *Neposa isabelae* / Austin & A. Warren /. Paratype male (ADW #98-15) with same data as holotype but 4 December 1965. Both holotype and paratype deposited at AMNH.

**Type locality.** GUATEMALA: Chimaltenango Department; Acatenango, Quisache, 1750m, ca. 14°33'7"N, 90°56'32"W.

**Etymology.** This species is named in honor of Isabel Vargas-Fernández of Mexico City, Mexico. Isabel has been instrumental in documenting the butterfly diversity of Mexico for the past two decades, and has provided an enormous amount of help and friendship to the junior author in his studies on Mexican HesperIIDae over the past 15 years.

**Distribution and phenology.** The species is apparently known only from the holotype and paratype taken in south-central Guatemala during October and December of 1965.

**Diagnosis and discussion.** On the dorsum, *N. isabelae* and *N. armandoi* both somewhat resemble a darkly marked *Librita librita*. The venters are very different presenting a distinctly mottled aspect on *Neposa*. Besides its smaller size as the smallest of the known *Neposa*, *N. isabelae* has but two subapical macules on the forewing compared with three on *N. armandoi*. The ventral surface of *N. isabelae* is darker than that of *N. armandoi*, especially so on either side of vein 2A on the hindwing. Male genitalia of *N. isabelae* are different from both *N. heras* and *N. armandoi*. The gnathos is much narrower than on either of the latter two species and conspicuously shorter than the uncus. The saccus is shorter than on other species in the genus. The valva is relatively short with an angular harpe similar to *N. heras* (elongate with a curved harpe on *N. armandoi*). In addition, the aedeagus has a small keel-like titillator on its ventral surface, a trait absent on both *N. heras* and *N. armandoi*.

**Discussion of *Neposa*.** *Neposa* is yet another hesperiine taxon of montane regions of the northernmost neotropics. These have phenotypes that are seen across a number of such taxa. Among the known *Neposa*, males have orange macules and females are marked by a number of white, in addition to orange, macules on the forewing, a pattern of sexual dimorphism seen among species of *Onespa*, *Buzyges*, and *Paratrytone*. The male of two species, *N. armandoi* and *N. isabelae*, somewhat resemble darkly marked *Librita librita* in dorsal view. The genitalia, however, although exhibiting some broad resemblances to those of other genera reviewed herein, have their own uniquely combined suite of characters. On males, these include a very short and unhooked uncus, a tegumen broadened centrally in dorsal view, a broad and often angled valva prominently serrated on its ventrocaudal edge with incurved triangular processes, a short and stout aedeagus, and cornuti that are broad cephalad and narrow abruptly to a spike-like caudal end. The straight, expanding, and twisted ductus bursae with internal sclerotization (but no lateral pouch) sets females apart from other apparently related taxa.

Study of various genera considered here and elsewhere (e.g., Burns 1992a, 1994b) indicates the necessity for careful examination of genitalia to make generic assignments, especially in the absence of one of the sexes. For *Neposa*, males are unknown for *N. hestia* and females for *N. armandoi* and *N. isabelae*. Fortunately for the purposes of their proper placement in *Neposa*, genitalia of those species lends confidence to the generic assignments made here. The males of *N. armandoi* and *N. isabelae* are unequivocally congeneric with the male of *N. heras* as is the single female of *N. hestia* with the female of *N. heras*.

*Neposa* appear to occur in highly localized habitats in humid montane environments, and seem to have very restricted geographic distributions. Perhaps because of this, they remain extremely rare in collections. *Neposa heras* appears to be endemic to the southern Sierra Madre del Sur, in Guerrero and Oaxaca, Mexico. At least in Oaxaca, it flies in close parapatry (or possible sympatry) with *N. armandoi*, the latter appearing endemic to the region. *Neposa hestia* is currently known only from the Sierra Madre Oriental in Veracruz, and *N. isabelae* is known only from Guatemala. Thus far, we lack records of *Neposa* from Chiapas, although we suspect the genus occurs there.

Until future field workers are able to secure male specimens of *N. hestia* and females of *N. armandoi*, the relationship between these two taxa will remain speculative. We have opted to name both populations since most taxa endemic to montane cloud forest habitats in Mexico show differentiation between eastern (northern in Oaxaca) and western (southern in Oaxaca) populations, at the species (e.g., de la Maza and Díaz 1978, Llorente and Escalante 1992) or subspecies-level (e.g., Miller and Miller 1979, de la Maza and Lamas 1982, Llorente 1984, 1986, Llorente and Luis 1988, 1992, Llorente et al. 1992).

#### Key to male *Neposa* (male of *N. hestia* unknown)

1. Dorsal forewing orange submarginal macules caudad of  $M_3$  heavily overscaled with brown ..... ***N. heras* Godman**
- Dorsal forewing orange submarginal macules caudad of  $M_3$  not overscaled ..... **2**
- 2(1). Larger (forewing >14 mm), dorsal forewing with three subapical macules, elongate and curved valva ..... ***N. armandoi*, new species**
- Smaller (forewing ≤14 mm), dorsal forewing with two subapical macules, short and angular valva ..... ***N. isabelae*, new species**

#### Key to female *Neposa* (female of *N. armandoi* and *N. isabelae* unknown)

1. Caudal edge of lamella postvaginalis with lobes widely spaced, caudal edge of lamella antevaginalis deeply V-shaped ..... ***N. hestia*, new species**
- Caudal edge of lamella postvaginalis with lobes closely spaced, caudal edge of lamella antevaginalis shallowly V-shaped ..... ***N. heras* Godman**

## General discussion and conclusions

The historical recognition that male genitalia are of great value for species-level identification of skippers was adequately summarized by Burns (1994b). Burns (1994b) further (see also Steinhauser 1974) lamented the underutilization of female genitalia towards those same goals and the general hesitation in using genital morphology to infer relationships among taxa. These prejudices and limitations have subsequently abated largely through several investigations within the past two decades; genital morphology of females has been shown not only useful in determining females, but also to define and delimit genera (e.g., Burns 1987, 1989, 1992a,b, 1994a, 1996, 1998, Austin and Mielke 1997, 2000; Burns and Janzen 1999, 2005a; MacNeill 1993, 2002, MacNeill and Herrera 1998) and even tribes and subfamilies (e.g., Warren et al. 2008a, 2009). Those studies focusing on genital morphology of both sexes and its evaluation have reinforced taxonomic constructs from other traits and have been useful towards a number of generic rearrangements among hesperiines. Burns (1987, 1989, 1990, 1992a, 1994a, 1994b), in his in-depth investigations of several groups of hesperiine skippers, has repeatedly noted that species exhibiting strikingly similar superficial appearances are not necessarily closely related. Closer examination of morphology, particularly that of the genitalia, reveal affinities not otherwise apparent suggesting “rampant parallelism and convergence” (Burns 1992a) in a number of distinct lineages, that may be due to mimicry (Brown 1987, Scott 1986, Austin et al. 1993, Burns 1998) or some other common signaling function (Shapiro 1978). In fact, structures of the genitalia of both sexes establish a generic gestalt upon which species-level differentiation may be evaluated. Often seemingly insignificant in size or complexity, those traits may be key to the definition of genera (Burns 1994b). When multiple genital characters suggest genus-level groupings, homoplasy among superficial characters can be detected.

This review presents a further rearrangement within Hesperinae (see citations in introduction), including the description of a new genus and six new species. The four genera, collective members of a fauna of middle and high elevations in the northern neotropics, possess similarities in a number of traits. Despite a richness of superficial appearance resembling such disparate genera as *Dalla*, *Poanes*, *Paratrytone*, and *Quasimellana*, they are black with variable orange or white markings on both dorsal wings and some exhibit notable sexual dimorphism. All have relatively long antennae, largely exceeding 1/2 of the costal length of the forewing with robust clubs and nodal lengths of 11 to 15 segments. The uncus of male genitalia is undivided; the divided gnathos is connivent caudad; the tegumen flares cephalad; the valva is simple with no clear differentiation of the costa, ampulla, and harpe, constricted near its middle on the ventral edge, has small dorsal projections (near or at the juncture of the harpe and ampulla), and either is produced caudad or has smaller caudal projections. The aedeagus is relatively simple, often tube-shaped, and has no or unadorned titillators; the cornuti include one or two sclerotized pointed structures and often a flexible structure. Female genitalia have broad lamellae, with both the lamella postvaginalis and lamella antevaginalis variably excavate on their caudal edges; a broad and shallow ostium bursae; a well-sclerotized and relatively straight ductus bursae (somewhat upcurved on *Buzyges*, slightly twisted on *Neposa*); and a robust corpus bursae. The ecological and morphological traits (especially the genital gestalt) of these four genera appear to delineate a monophyletic clade within Hesperini.

The genera each differ by their own unique consistent divergence from the above described generalized ground plan. The group as a whole is distinguished from other genera of Evans' (1955) “*Hesperia* subgroup” (the first 23 genera of Hesperini listed by Warren et al., 2009) by a variety of genital traits, the majority of which have the ampulla clearly separate from the harpe as noted by Warren et al. (2009). Those genera (except *Appia* Evans, 1955, and *Linka* Evans, 1955) have been examined as part of this study and augmented by variably detailed illustrations of their genitalia (e.g., Godman and Salvin 1879-1901; Lindsey et al. 1931; Hayward 1950; Evans 1955; MacNeill 1964, 1993, 2002; Miller 1965; Burns 1985, 1987, 1989, 1990, 1992a, 1994a, 1994b; Shuey 1987; Chiba and Tsukiyama 1996; MacNeill and Herrera 1998; Austin and DeVries 2001). Of other genera now included within Hesperini (Warren et al. 2008a, 2009), *Euphyes* Scudder, 1872, and *Arotis* Mabille, 1904 (see also Mielke 1972; Shuey 1987, 1993); *Metron* Godman, 1900; *Propertius* Evans, 1955 (see also de Jong 1983b, Austin 2008), *Phemiades* Hübner, [1819] (see also de Jong 1983b, Steinhauser and Austin 1993); and *Atrytonopsis* Godman, 1900, (see also Burns 1982, 1983; Warren 2009) were examined in less detail; the genitalia of the remaining genera were briefly reviewed from illustrated genitalia (especially from Godman and Salvin 1879-1901, Hayward 1950, Evans 1955). None examined exhibited resemblance to the four genera reviewed in this paper.

The number of new species described herein plus the rarity of most in collections and the distributions of some including a single locality are indicative of both a general lack of knowledge of higher elevational hesperiine faunas in Mesoamerica and the possibility that these are the last remnants of their more widespread distribution in the Pleistocene or subsequently. If these apparent distributions reflect reality, the consequences of increasing anthropic and of potential global climatic perturbations lend meager prospect of continued survival for many of these taxa. Our results also stress the need for attentive collections from these poorly investigated habitats throughout Mexico and Central America.

The four genera treated herein may be distinguished through the following keys:

### Males

1. Male without stigma ..... 2  
Male with stigma ..... 3
- 2(1). Combination of very long saccus, cornuti including large and spike-like structures, and well-developed flexible spinulose pad ..... **Onespa Steinhauser**  
— Without the above combination with saccus shorter, spikes smaller, and/or spinulose pad less well-developed ..... **Buzyges Godman**
- 3(1). Harpe elongate, cornuti not expanded cephalad ..... **Librita Evans**  
— Harpe not elongate, cornuti greatly expanded cephalad ..... **Neposa Austin and A. Warren**

### Females

1. Ductus bursae with extensive, complex internal plate-like sclerotization ..... 2  
— Ductus bursae without internal complex sclerotization ..... 3
- 2(1). Ductus bursae with lateral pouch-like sclerotization towards cephalic end ..... **Onespa Steinhauser**  
— Ductus bursae without sclerotized pouch-like structure ..... **Neposa Austin and A. Warren**
- 3(1). Pale markings on dorsum narrow, ductus bursae conspicuously constricted in ventral view, curved dorsad in lateral view ..... **Buzyges Godman**  
— Pale markings on dorsum broad, ductus bursae slightly constricted in ventral view, straight in lateral view ..... **Librita Evans**

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**Postscript by Andrew D. Warren.** George T. Austin, a regular contributor to *Insecta Mundi* in recent years, passed away on 30 June, 2009, in Gainesville, Florida, a week after final accepted files for this paper were submitted. Both of us were proud of this submission, for it revises what is apparently a diverse monophyletic group of neotropical skipper genera never before treated in detail, tying together several loose nomenclatural ends. This paper is the result of multiple daily conversations between George and I, whenever I was not away seeking additional material for this and other projects we have in preparation, as well as countless hours of field and lab work by both of us (and many others). Even though I initiated this project in 1994, George was undoubtedly the driving force in bringing it to completion. George's perseverance was truly unmatched, and his friendship was so very sincere. While a formal obituary for George will take some time to complete, an incomplete memorial for George may be viewed at the following webpage: <http://butterfliesofamerica.com/GTA.htm>.

